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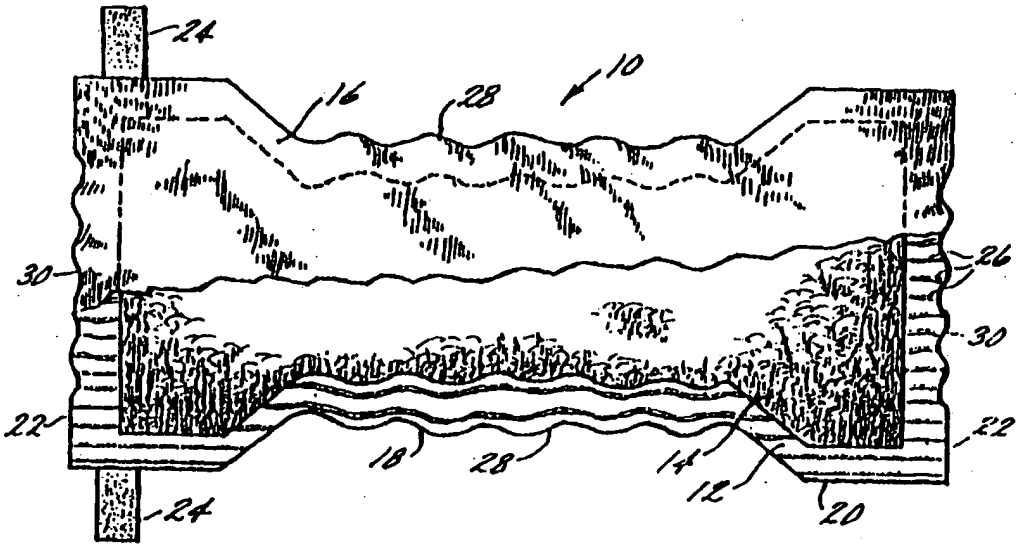

(57) Abstract

Elasticized absorbent products, e.g. disposable diapers (10), training pants, feminine hygiene pads and adult incontinence disposables, in accordance with the present invention, comprises a moisture impervious backsheet (12) which is overlaid by a moisture absorbent fluff filler pad (14). This, in turn, is covered with a moisture pervious topsheet (16). The backsheet (12) is overlaid by a pervious topsheet (16). The backsheet (12) or the non-woven topsheet (16) is comprised of elastic material that is multi-directionally stretchable prior to and after attachment of the sheets. Alternatively, a separate elastic sheet can be added to the assembly which is multi-directionally stretchable prior to and after attachment of the other sheets.

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ELASTICIZED ABSORBENT PRODUCTS

Background of the Invention:

The present invention relates to elasticized absorbent products, e.g., disposable diapers, training pants, feminine pads and adult incontinence disposable, and a method for making the same. More specifically, the present invention relates to elasticized absorbent products wherein at least one of the sheets is comprised of a stretchable elastomeric material which is utilized to form elasticized features.

In recent years, elasticized absorbent products, e.g., disposable diapers, training pants, feminine pads and adult incontinence disposable, have become more complicated and have evolved by adding many new features to improve leakage performance. One of the major improvements has been the better use of elasticized features and as a result, the use of more elastic components, which help to prevent leakage by improvements in fitting characteristics of the products. A side effect of improvements in the elastification of diapers, training pants, adult products and feminine hygiene products is the increased component complexity and expense of assembling these new structures by commonly used equipment. Conventional methods of providing elasticized features such as waistbands, standing leg gathers (SLGs) and leg elastics generally require separate elastic threads, fabrics or films which differ in chemistry and construction from the normal plastic backsheet barrier films and coverstocks. As more elastic features are added to the designs,

manufacturing complexity is inevitably increased; aside from the undesirable complication of the machinery used to assemble the products, there is the increase in component material waste and loss of manufacturing machine efficiency which can be attributed to the use of more and more materials and specially made elasticized parts.

Further, garments having localized elasticized areas for ensuring relatively tight fits around such body zones as wrists, waist or thighs have long been manufactured. Initially, and still to a certain extent, the elastic has been applied by sewing while held in a stretched condition. When relaxed, the elastic causes a shirring or puckering of the elasticized area of the garment. Sewing elastic is a relatively slow and expensive manufacturing operation. Many inventors have dedicated their energy to finding simpler methods of attaching elastic. As one example, Gray, U.S. Pat. No. 1,544,312, used a partially cured rubber strip which was mechanically crimped to the garment and later heat cured. Maxey, U.S. Pat. No. 2,905,181, used a band of nitrile rubber which was heat sealed to a moisture impervious polyvinyl chloride film.

Disposable diapers for infants have been the subject of a great deal of inventive activity to prevent leakage. One very successful effort in this regard was the use of a box pleat around the thigh areas of an infant. A diaper of this type is described by Duncan et al in U.S. Pat. No. Re. 26,152. While this construction represented a major step forward, it still did not provide an entirely satisfactory solution to the problem of leakage. Another move toward an ultimate solution is described by Buell in U.S. Pat. No. 3,860,003. The Buell diaper used narrow ribbons of stretched elastic along each longitudinal side margin in the thigh encircling areas. This construction has been so highly successful that it has been emulated and improved upon by subsequent inventors in the field. The following U.S. Pat. Nos. are exemplary of these later developments: Woon et al, 4,050,462; Strickland et al, 4,253,461; Sigl et al, 4,437,860; and Teed, 4,405,397. The Strickland et al product represents a move beyond diapers suitable only for infants and is a product principally adapted for use by incontinent adults. Schaar, in U.S.

Pat. No. 3,951,150, shows an infant diaper having and elasticized waist encircling area designed for reducing leakage from that portion of the product.

The above list is presented primarily to indicate historical development of diapers having elasticized zones and is not intended to be fully inclusive of all such products which have been developed. All of these examples use an elastic material which is normally a relatively narrow ribbon of natural rubber adhesively bonded between the backsheet and cover sheet of the diaper. The use of adhesive bonding, usually with flexible hot melt adhesives, has enabled the production of elasticized disposable diapers at high rates of speed.

During the later part of the time period represented by the above patents, a parallel approach has been developing using non-rubber elastomeric materials. These are based on a wide variety of synthetic polymers which typically are uniaxially or biaxially stretched during their manufacture into relatively thin film. This stretching induces stresses which are frozen into the product when it is cooled while being held under unixially or biaxially applied tension. Certain of these materials retain a memory of their dimension in the original unstretched state. Depending on the particular polymer chosen, and its method of manufacture, by heating to a specific predetermined temperature, the material will shrink back to approximately this original dimension. These polymeric products can be readily tailored to be of elastomeric nature. The term "elastomeric" is interpreted in various ways, but here it is generally meant to mean that a product may be stretched to as least about

120-140% of its original length and return to that length without permanent deformation when the stretching force is released. Many of the products available are relatively inelastic in their uni- or biaxially oriented heat unstable forms and would not meet the above criterion. However, some of these become fully elastic when heat shrunk. A further feature of many of these polymers is that they can be heat sealed or bonded to other materials at a temperature below the point which will cause heat shrinkage. This is especially convenient for the manufacture of elasticized garment since it infers that the material may be applied without the need

to be held under tension. A subsequent heating step is all that is needed to produce an elasticized zone.

While many polymeric materials of generically different types can be cited as being useful in the above application, the following U.S. Pat. Nos. should be considered as being exemplary: Perrin et al, 2,200,249; White, 2,953,551; Cook et al, 3,086,242; Holden et al, 3,265,765; and Pellicciari et al, 3,551,540. The following British Pat. Nos. also disclose such polymer compositions: 866,819; 866,820; 866,821; 866,822; and 1,010,064.

The original application of heat shrunk elastic to garments appears to have been done by Mason as shown in U.S. Pat. 3,245,407. Here the inventor produced plastic panties with heat shrunk elasticized leg and waist zones. Mason showed other applications as well. Later, Althouse in U.S. Pat. No. 3,639,917 showed the use of heat shrinkable elastic ribbons in other applications such as wrist cuffs on disposable hospital garments. Massengale et al, in U.S. Pat. No. 3,819,401, and Koch et al, in U.S. Pat. No. 3,912,565 show the use of specific heat shrinkable materials for making elasticized areas in garments such as panties. Schirmer, in U.S. Pat. No. 3,755,062, shows the use of a film of heat shrinkable materials for making bulked fabric articles such as non-woven rugs.

Natural rubber is a relatively inexpensive product and for this and other reasons, it is normally used in the form of threads or relatively narrow ribbons when used to elasticize portions of garments. A disadvantage of this construction is that the elasticized portion of the garment frequently presents a small and very narrow bearing area against the skin of the wearer. Thus, if the purpose of the elasticized area is to prevent leakage, as in the case of a disposable diaper with elastic legs, the elastic must be held under relative high tension to provide a tight seal. This will frequently result in chafing and general discomfort to the wearer. One solution to this problem has been to use parallel narrow strips of rubber elastic to increase the bearing area. A diaper having this type of construction is seen in Repke, U.S. Pat. No 4,430,086. While this approach has been effective, it is relatively expensive because of the additional elastic required. It also considerably

complicates manufacture of the product. For this reason, disposable diaper designers have turned to the use of heat shrunk elastomers which can be used in the form of relatively wider ribbons to increase bearing area.

Heat shrinkable materials became of interest to diaper designers as another method for overcoming the cutting and chafing problem caused by narrow elastic. A considerable number of patents have issued, beginning about 1980, directed to the use of heat shrinkable elastic ribbons placed in marginal areas of disposable diapers. In some of these the heat shrinkable elastomer is used only in the leg area, along the longitudinal margins. In others it is used only in the waist area along the transverse margins of the diaper. In still other constructions, the heat shrinkable elastic is used in both locations. Representative examples of disposable diapers using heat shrunk elastic are found among the following U.S. Pat. Nos.: Repke et al, 4,205,679 and 4,430,086; Mesek et al, 4,324,245 and 4,352,355; Pieniak, 4,333,782; Pieniak et al, 4,337,771 and 4,413,623; Sciaraffa et al, 4,381,781; Sigl, 4,486,192; Kievit et al, 4,515,595; and Reiter, 4,563,185. The following British patent applications are also of interest: Lash, No GB 2,136,677A and Chapman et al, No. GB 2,136,678A.

All of the above patents use discrete ribbons of the heat shrinkable elastic material. These differ greatly in configuration, location, method of attachment, and area in which they are heat shrunk.

In making a disposable diaper with elastic legs having rubber elastic, and end-to-end assembly is normally held under sufficient tension during manufacturing to prevent wrinkling of the edges. U.S. Pat. Nos. to Buell, 4,081,301; Gore, 4,239,578; Teed, 4,309,236, 4,325,372, and 4,405,397; Frick 4,397,704; and Frick et al, 4,371,417 are exemplary of patents showing equipment for the insertion of elastic along the longitudinal edges of disposable diapers. Sigl, U.S. Pat. No. 4,412,881 and Sabee, U.S. Pat. No. 4,227,952 show equipment for insertion of discrete lengths of tension elastic along longitudinal edges. In addition, these following United States patents show methods and apparatus for inserting elastic inserts transversely across the ends of diapers forming the waist portions: Kiela,

U.S. Pat. No. 3,844,288; Rega, U.S. Pat. No. 4,240,866; Joa, U.S. Pat. No. 4,284,454; and Pieniak, U.S. Pat. No. 4,488,923. Klasek, in U.S. Pat. No. 4,293,367 shows a method and apparatus for contouring elastic around longitudinal leg cutouts of disposable diapers. This list is cited as being exemplary only and is not intended to be all inclusive.

U.S. Pat. No. 4,726,807 is directed towards a method and apparatus for the manufacture of diapers having elastic leg and/or waist areas formed using areas of heat shrinkable elastomeric materials located in the appropriate marginal zones of the diaper. These heat shrinkable elastomeric material are those which are heat unstable and relatively inelastic in their unshrunk form and stable and relatively elastic in their heat shrunk form. They may comprise discrete strips located along the appropriate marginal areas of the diapers. Alternatively, the entire moisture impermeable backing sheet or the diaper comprises the heat shrinkable elastomeric material. The method of U.S. Pat. No. 4,726,807 includes uniting the individual components to form a continuous end-to-end or side-by-side assembly of diaper units. These assemblies are maintained under sufficient longitudinal tension to prevent wrinkling during the manufacturing process. At some point an appropriate area of the longitudinal edges of each diaper unit is heated to a temperature sufficiently high to enable shrinkage of the elastomeric material. Immediately thereafter the marginal longitudinal tension is relaxed while tension is maintained in the central portion of the assembly. The marginal tension is kept in relaxed condition for a sufficient time for the heated elastomeric material to shrink and cool to a temperature where it is again stable, thereby creating marginal elasticized zones on the diapers.

Summary of the Invention:

The above-discussed and other drawbacks and deficiencies of the prior art are overcome or alleviated by the elasticized absorbent products, e.g., disposable diapers, training pants, feminine pads and adult incontinence disposable, of the present

invention. Disposable garments for adult incontinence, baby diapers, training pants and feminine hygiene products, which are the subject to this invention, can be manufactured using a simplified system with fewer materials and a simplified manufacturing process. In accordance with the present invention, at least one sheet of the elasticized absorbent product is comprised of a stretchable material which is utilized to form elasticized features.

The use of elastic films to replace the relatively non-extensible film backsheets normally used allows the film to produce more than one elastic feature while also performing the traditional backsheet role as a liquid barrier. The elastic film replaces the conventional relatively non-extensible plastic film backsheet commonly used in the industry. Alternatively, the use of elastic nonwoven fabric (i.e., a nonwoven fabric incorporating elastic fibers, as is known in the industry) to replace the relatively non-extendable moisture pervious nonwoven top sheet normally used allows the fabric to produce more than one elastic feature while also performing the traditional top sheet role as a pervious layer. The elastic nonwoven fabric replaces the conventional relatively non-extensible nonwoven top sheet commonly used in the industry. The simplified system eliminates the additional elastic material components normally used to manufacture standing leg gathers, waistbands and elastic leg constructions by eliminating use of the separate extensible foams, elastic threads, ribbons and narrow strips of elastic films that must be assembled and replacing them by differentially stretching at least one of the elastic sheets to produce variable "system elasticity" throughout the finished absorbent product.

The invention also overcomes the difficulties associated with producing a successful absorbent product that develops and retains its three-dimensional shape and good body-fitting characteristics without the use of exotic materials and preserves the manufacturability of such products at high speed on conventional equipment such as is now commonly used in the industry. These improved body-fitting characteristics are further enhanced by the use of variably stretching across the whole product. A further advantage of this approach is the ability to easily

make three-dimensionally contoured final products which assume predictable shapes when worn on the body, while still using conventional coverstock fabrics, which are relatively inelastic but which are abundant in supply and low in cost. It will be appreciated that the present invention allows the use of flat materials for forming three-dimensional products.

A diaper (i.e., adult incontinence or baby diapers) in accordance with a first embodiment the present invention comprises a moisture impervious backsheet which is overlaid by a moisture absorbent fluff filler pad. This, in turn, is covered with a moisture pervious nonwoven top sheet. Each diaper unit typically has longitudinal margins which define the leg encircling crotch areas and longitudinal margins which are located in the waistband area. The diapers further have transverse margins which further define the ends of the waistband areas. The backsheet comprises a moisture impermeable elastic material that is multidirectionally stretchable prior to and after attachment to the nonwoven top sheet. In accordance with an alternate embodiment, the top sheet comprises a moisture pervious elastic nonwoven material that is multidirectionally stretchable prior to and after attachment to the backsheet. The entire assembly is bonded together by an adhesive, sonobonding, ultrasonic welding/bonding, thermobonding or other suitable means. The backsheet (in the alternate embodiment, the top sheet) at the leg encircling crotch areas is longitudinally stretched and/or the waistband areas are transversely stretched prior to bonding of the backsheet to the nonwoven top sheet. The stretched portions of the backsheet (in the alternate embodiment, the top sheet) are then bonded, while stretched, to the nonwoven top sheet (in the alternate embodiment, the backsheet). Once the bonding is completed, these selected portions of the backsheet (in the alternate embodiment, the top sheet) are relieved, resulting in shirred or gathered edges with accompanying folds.

Alternatively, the nonwoven top sheet (in the alternate embodiment, the backsheet) at the leg encircling crotch areas and/or the waistband areas is pleated (which may comprise variable tension pleats) or corrugated prior to bonding of the

backsheet to the nonwoven top sheet. Once the bonding is completed, these selected portions provide shirred or gathered edges with accompanying folds.

A diaper (i.e., adult incontinence or baby diapers) in accordance with a second embodiment the present invention comprises a moisture impervious backsheet which has a nonwoven sheet bonded thereto. The leg encircling crotch areas of the backsheet are longitudinally stretched and/or the waistband areas of the elastic backsheet (in an alternate embodiment, the elastic nonwoven sheet) are transversely stretched prior to bonding of the backsheet to the nonwoven sheet. The stretched portions of the backsheet (in the alternate embodiment, the nonwoven sheet) are then bonded, while stretched, to the nonwoven sheet (in the alternate embodiment, the backsheet) . The backsheet and the nonwoven sheet are bonded together by an adhesive, sonobonding, ultrasonic welding/bonding, thermobonding or other suitable means. Once the bonding is completed, these selected portions of the backsheet (in the alternate embodiment, the nonwoven sheet) are relieved, resulting in shirred or gathered edges with accompanying folds. Alternatively, the nonwoven sheet (in the alternate embodiment, the backsheet) at the leg encircling crotch areas and/or the waistband areas is pleated (which may comprise variable tension pleats) or corrugated prior to bonding of the backsheet to the nonwoven sheet. Once the bonding is completed, these selected portions provide shirred or gathered edges with accompanying folds. A moisture absorbent fluff filler pad is overlaid on the nonwoven sheet. This, in turn, is covered with a moisture pervious nonwoven top sheet. The nonwoven sheets with the filler pad therebetween are bonded by an adhesive, sonobonding, ultrasonic welding/bonding, thermobonding or other suitable means.

A diaper (i.e., adult incontinence or baby diapers) in accordance with a third embodiment of the present invention comprises a moisture impervious backsheet which is overlaid by a moisture absorbent fluff filler pad (i.e., absorbent core). This, in turn, is covered with a moisture pervious nonwoven top sheet (i.e., coverstock). Once the layers of the diaper have been stacked, as described above, the backsheet and coverstock layers are folded inwardly to form standing leg

gathers. Once the layers are folded as described above leg cutouts are made. Accordingly, the diaper of this embodiment, has do most diapers, has longitudinal margins which define the leg encircling crotch areas and longitudinal margins which are located in the waistband area. The diapers further have transverse margins which further define the ends of the waistband areas. The entire assembly is bonded together by an adhesive, sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method, as described below.

The nonwoven sheet at the leg encircling crotch areas and the raised leg gathers are pleated or corrugated, prior to bonding to the elastic backsheet to allow stretching in this area. The bonding of the backsheet at the pleats to the nonwoven top sheet will secure the layers and the pleats or corrugations while allowing the portions of the diaper having these pleats to be stretched. Accordingly, the backsheet is allowed to stretch, as a result of the bonding to the nonwoven top sheet at the base of the pleats or corrugations. Once the bonding is completed, these selected portions provide shirred or gathered edges with accompanying folds. The cover sheet at the waistband areas is corrugated or pleated, prior to bonding to allow stretching in this area. The bonding of the backsheet to the nonwoven top sheet at the corrugations or pleats will secure the layers while allowing the portions of the diaper having these corrugations or pleats to be stretched. Once the bonding is completed, these selected portions provide shirred or gathered edges with accompanying folds.

In accordance with an alternate embodiment, the nonwoven sheet is elastic, whereby the backsheet at the leg encircling crotch areas and the raised leg gathers are pleated or corrugated, prior to bonding to the elastic nonwoven sheet to allow stretching in this area. The bonding of the nonwoven sheet at the pleats or corrugations to the backsheet will secure the layers and the pleats or corrugations while allowing the portions of the diaper having these pleats or corrugations to be stretched. Accordingly, the nonwoven sheet is allowed to stretch, as a result of the bonding to the backsheet at the base of the pleats or corrugations. Once the bonding is completed, these selected portions provide shirred or gathered edges with

accompanying folds. The backsheet at the waistband areas is corrugated or pleated, prior to bonding to allow stretching in this area. The bonding of the backsheet to the nonwoven top sheet at the corrugations or pleats will secure the layers while allowing the portions of the diaper having these corrugations or pleats to be stretched. Once the bonding is completed, these selected portions provide shirred or gathered edges with accompanying folds.

The elastic leg encircling crotch areas and waistband areas ensure a tight fit and are important in preventing leakage when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges are generally placed under tension and the diaper surface is drawn reasonably flat.

A feminine pad (or an adult bridge product) in accordance with a fourth embodiment of the present invention comprises a moisture impervious backsheet which is overlaid by a moisture absorbent core. This, in turn, is covered with a moisture pervious nonwoven top sheet (i.e., coverstock). The coverstock has corrugations formed latitudinally at about the longitudinal center thereof. Once the layers of the pad have been stacked, as described above, the backsheet and coverstock layers are bonded at the corrugations. Bonding is accomplished by a suitable adhesive, sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method. The pad and thereby the backsheet is longitudinally stretched, where the remaining periphery about the absorbent core of the backsheet and the coverstock are bonded while in the stretched state.

Once the bonding is completed the pad is relaxed, resulting in shirred or gathered edges with accompanying folds. These elastic areas are important as they aid in the prevention of leakage when worn by a user.

The use of an elastic sheet is an important element of the present invention as it can be stretched at various places during the assembly process to produce a three-dimensional products that has a controlled three-dimensional shape on the wearer.

A diaper in accordance with still another embodiment of the present invention comprises a moisture impervious backsheet which is overlaid by a

moisture absorbent fluff filler pad (i.e., absorbent core). This, in turn, is covered with an elastic sheet followed by a moisture pervious nonwoven top sheet (i.e., coverstock). The elastic sheet has a generally centered oval shape opening therein (i.e., at the crotch area). Once the layers of the diaper have been stacked, the elastic sheet and coverstock layers are folded inwardly to form standing leg gathers. The elastic sheet is stretched at the standing leg gathers areas and at the leg encircling crotch areas, prior to bonding. The elastic sheet at the stretched areas is bonded under tension to the coverstock and/or the backsheet. Once the bonding is completed, these selected portions are relieved, resulting in shirred or gathered edges with accompanying folds. Standing leg gathers are formed by folded the elastic sheet and the coverstock inwardly, where they are bonded at selected areas. Thereafter, leg cutouts are made to define the leg encircling crotch areas.

Again, these elastic leg encircling crotch areas, the raised leg gathers, and the elastic waistband areas ensure a tight fit and are important in preventing leakage when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges are generally placed under tension and the diaper surface is drawn reasonably flat. The use of the elastic sheet is an important element of the present invention as it can be stretched at various places during the assembly process to produce a three-dimensional products that has a controlled three-dimensional shape on the wearer.

The above-discussed and other features and advantages of the present invention will be appreciated and understood by those skilled in the art from the following detailed description and drawings.

Brief Description of the Drawings:

Referring now to the drawings wherein like elements are number alike in the several FIGURES:

FIGURE 1 is a plan view of a disposable diaper in accordance with a first embodiment of the present invention;

FIGURE 2 is a plan view of a disposable diaper in accordance with a second embodiment of the present invention;

FIGURE 3 is a side elevation view of the disposable diaper of FIGURE 2;

FIGURE 4 is a perspective view of a disposable diaper in accordance with a third embodiment of the present invention;

FIGURE 5 is an end view of the disposable diaper of FIGURE 4 prior to bonding;

FIGURE 6 is a bottom view of the disposable diaper of FIGURE 4 prior to bonding;

FIGURE 7 is an end view of the disposable diaper of FIGURE 4 that has been folded into proper configuration, prior to bonding;

FIGURE 8 is a top view of the disposable diaper of FIGURE 4 that has been folded into proper configuration and having the leg cutouts indicated, prior to bonding;

FIGURE 9 is a top view of a plurality of pleats in the disposable diaper of FIGURE 4;

FIGURE 10 is an end view of a plurality of corrugations at the waistband of the disposable diaper of FIGURE 4;

FIGURE 11 is a perspective view of a feminine pad or an adult bridge product in accordance with a fourth embodiment of the present invention;

FIGURE 12 is an end view of a form for use in manufacturing the feminine pad of FIGURE 11;

FIGURE 13 is a side view of the form of FIGURE 12;

FIGURE 14 is a top view of the form of FIGURE 12;

FIGURE 15 is an end view of the feminine pad of FIGURE 11, prior to bonding, disposed on the form of FIGURE 12;

FIGURE 16 is a side view of the feminine pad of FIGURE 11, prior to bonding, disposed on the form of FIGURE 12;

FIGURE 17 is a top view of the feminine pad of FIGURE 11 with a cut line indicated, prior to bonding, disposed on the form of FIGURE 12;

FIGURE 18 is a top view of a first layer of the absorbent core of the feminine pad of FIGURE 11;

FIGURE 19 is a top view of a second layer of the absorbent core of the feminine pad of FIGURE 11;

FIGURE 20 is a top view of the second layer of absorbent core, illustrating the folding of the tabs thereof;

FIGURE 21 is an end view of the absorbent core of the feminine pad of FIGURE 11;

FIGURE 22 is a side view of the feminine pad of FIGURE 11 after an initial bonding step in a relaxed state;

FIGURE 23 is a top view of the feminine pad of FIGURE 11 after an initial bonding step in a relaxed state;

FIGURE 24 is a side view of the feminine pad of FIGURE 11 after the final bonding step in the stretched state;

FIGURE 25 is a top view of the feminine pad of FIGURE 11 after the final bonding step in the stretched state;

FIGURE 26 is a perspective view of a disposable diaper in accordance with an alternate embodiment of the present invention;

FIGURE 27 is an end view of the disposable diaper of FIGURE 26 prior to bonding;

FIGURE 28 is a top view of the disposable diaper of FIGURE 26 prior to bonding;

FIGURE 29 is a top view of the disposable diaper of FIGURE 26 that has been folded to form standing leg gathers, prior to bonding;

FIGURE 30 is a cross sectional view taken along the line 30 - 30 in FIGURE 29;

FIGURE 31 is a cross sectional view taken along the line 31 - 31 in FIGURE 29;

FIGURE 32 is the same cross sectional view of FIGURE 31, showing the areas to be stretched;

FIGURE 33 is the same top view of FIGURE 29, showing the areas to be stretched.

FIGURE 34 is the same cross sectional view of FIGURE 32, showing the areas to be bonded under tension;

FIGURE 35 is the same top view of FIGURE 33, showing the areas to be bonded under tension;

FIGURE 36 is an end view of the disposable diaper of FIGURES 34 and 35 after initial bonding, showing the direction for folding of the standing leg gathers;

FIGURE 37 is a top view of the disposable diaper of FIGURES 34 and 35 after initial bonding, showing the direction for folding of the standing leg gathers;

FIGURE 38 is an end view of the disposable diaper of FIGURES 36 and 37 after final bonding of the folded standing leg gathers;

FIGURE 39 is a top view of the disposable diaper of FIGURES 36 and 37 after final bonding of the folded standing leg gathers; and

FIGURE 40 is a top view of the disposable diaper of FIGURES 38 and 39 indicating leg cutouts.

Description of the Preferred Embodiments:

In the description that follows, it will be understood by those skilled in the art that certain terms are relative. Most disposable diapers and adult incontinent pads are assembled in a continuous end-to-end fashion. In this case the sides of the diaper, which wrap around the upper thighs of the wearer, is the longitudinal direction. However, it is known for diapers to be manufactured in a continuous side-by-side assembly as, for example, is shown in Joa, U.S. Pat. No. 4,284,454. In this case, the ends, or waist encircling portion of the diaper is in the longitudinal direction of motion during manufacture. Thus, the terms "longitudinal" and "transverse" are relative and as used herein should not be considered as limiting to one orientation or the other.

Referring to FIGURE 1, a diaper in accordance with a first embodiment the present invention is shown generally at 10. Diaper 10 comprises a moisture

impervious backsheet 12 which is overlaid by a moisture absorbent fluff filler pad 14. This, in turn, is covered with a moisture pervious nonwoven top sheet 16. Each diaper unit typically has longitudinal margins 18 which define the leg encircling crotch areas and longitudinal margins 20 which are located in the waistband area. The diapers further have transverse margins 22 which further define the ends of the waistband areas. Adhesive attachment tapes 24 complete the unit, as is known. However, it will be appreciated that hook and loop fasteners (e.g., Velcro® fasteners) or other means of fastening may be employed.

Backsheet 12 comprises a moisture impermeable elastic material (e.g., a KRATON® Polymer such as is commercially available from Shell Chemical Company or a polyurethane such as part no. MP-1882P commercially available from the assignee hereof or, a suitable polyethylene or polypropylene) that is multidirectionally stretchable prior to and after attachment to nonwoven top sheet 16. The entire assembly is bonded together by a plurality of adhesive lines 26. Alternatively, the assembly is bonded together by sonobonding, ultrasonic welding/bonding thermobonding or any other suitable method. Backsheet 12 at the leg encircling crotch areas is longitudinally stretched and/or the waistband areas are transversely stretched (to at least about 100%) prior to bonding of backsheet 12 to nonwoven top sheet 16. The stretched portions of backsheet 12 are then bonded, while stretched, to nonwoven top sheet 16. The backsheet can be stretched at these areas to varying degrees to produce varying elasticity, e.g., increasing elasticity moving towards the edge. Once the adhesive has cured (i.e., the bonding is completed), these selected portions are relieved, resulting in shirred or gathered edges 28, 30 with accompanying folds.

Alternatively, nonwoven sheet 16 at the leg encircling crotch areas and/or the waistband areas are pleated (which may comprise variable tension pleats) or corrugated, as described hereinbelow, prior to bonding of backsheet 12 to nonwoven top sheet 16. The un-stretched backsheet 12 is then bonded at the pleats or corrugation to nonwoven top sheet 16. Once the adhesive has cured (i.e., the

bonding is completed), these selected portions provide shirred or gathered edges 28, 30 with accompanying folds.

In accordance with another alternate embodiment, backsheet 12 is not required to be comprises of an elastic material. However, it is within the scope of the present invention that both sheets could be comprised of an elastic material. Nonwoven top sheet 16 is comprised of an elastic nonwoven fabric (i.e., a nonwoven fabric incorporating elastic fibers, as is known in the industry) that is multidirectionally stretchable prior to and after attachment to backsheet 12. The entire assembly is bonded together as described before. Nonwoven sheet 16 at the leg encircling crotch areas is longitudinally stretched and/or the waistband areas are transversely stretched prior to bonding of backsheet 12 to nonwoven top sheet 16. The stretched portions of nonwoven sheet 16 are then bonded, while stretched, to backsheet 12. The nonwoven sheet can be stretched at these areas to varying degrees to produce varying elasticity, e.g., increasing elasticity moving towards the edge. Once the adhesive has cured (i.e., the bonding is completed), these selected portions are relieved, resulting in shirred or gathered edges 28, 30 with accompanying folds.

Alternatively, backsheet 12 at the leg encircling crotch areas and/or the waistband areas are pleated (which may comprise variable tension pleats) or corrugated, as described hereinbelow, prior to bonding of backsheet 12 to nonwoven top sheet 16. The un-stretched elastic nonwoven sheet 16 is then bonded at the pleats or corrugation to backsheet 12. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges 28, 30 with accompanying folds.

These elastic leg encircling crotch areas and/or the elastic waistband areas ensure a tight fit and are important in preventing leakage when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges 28, 30 are generally placed under tension and the diaper surface is drawn reasonably flat.

Referring to FIGURES 2 and 3, a diaper in accordance with another embodiment the present invention is shown generally at 10'. Diaper 10' comprises

a moisture impervious backsheet 12' which has a nonwoven sheet 32 bonded thereto. Backsheet 12' is the same as backsheet 12 described in the first embodiment. Each diaper unit typically has longitudinal margins 18' which define the leg encircling crotch areas and longitudinal margins 20' which are located in the waistband area. The diapers further have transverse margins 22' which further define the ends of the waistband areas. Adhesive attachment tapes 24' are included, as is known. Again, it will be appreciated that hook and loop fasteners (e.g., Velcro® fasteners) or other means of fastening may be employed.

The leg encircling crotch areas of backsheet 12' are longitudinally stretched and/or the waistband areas of backsheet 12' are transversely stretched (to about 100%) prior to bonding of backsheet 12' to nonwoven sheet 32. The backsheet can be stretched at these areas to varying degrees to produce varying elasticity, e.g., increasing elasticity moving towards the edge. The stretched portions of backsheet 12' are then bonded, while stretched, to nonwoven sheet 32. Backsheet 12' and nonwoven sheet 32 are bonded together by a plurality to adhesive lines 34. Alternatively, the sheets are bonded together by a sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method. Once the adhesive has cured (i.e., the bonding is completed), these selected portions of backsheet 12' are relieved, resulting in shirred or gathered edges 28', 30' with accompanying folds.

Alternatively, nonwoven sheet 32 at the leg encircling crotch areas and/or the waistband areas are pleated (which may comprise variable tension pleats) or corrugated, as described hereinbelow, prior to bonding of backsheet 12' to nonwoven sheet 32. The un-stretched elastic backsheet 12' is then bonded at the pleats or corrugation to nonwoven sheet 32. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges 28', 30' with accompanying folds.

In accordance with another alternate embodiment, backsheet 12' is not required to be comprises of an elastic material. Nonwoven sheet 32 is comprised of an elastic nonwoven fabric (i.e., a nonwoven fabric incorporating elastic fibers, as

is known in the industry) that is multidirectionally stretchable prior to and after attachment to backsheet 12'. These sheets are bonded together as described before. Nonwoven sheet 32 at the leg encircling crotch areas is longitudinally stretched and/or the waistband areas are transversely stretched prior to bonding of backsheet 12' to nonwoven sheet 32. The stretched portions of nonwoven sheet 32 are then bonded, while stretched, to backsheet 12'. The nonwoven sheet can be stretched at these areas to varying degrees to produce varying elasticity, e.g., increasing elasticity moving towards the edge. Once the adhesive has cured (i.e., the bonding is completed), these selected portions are relieved, resulting in shirred or gathered edges 28', 30' with accompanying folds.

Alternatively, backsheet 12' at the leg encircling crotch areas and/or the waistband areas are pleated (which may comprise variable tension pleats) or corrugated, as described hereinbelow, prior to bonding of backsheet 12' to nonwoven sheet 32. The un-stretched elastic nonwoven sheet 32 is then bonded at the pleats or corrugation to backsheet 12'. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges 28', 30' with accompanying folds.

A moisture absorbent fluff filler pad 14' is overlaid on sheet 32. This, in turn, is covered with a moisture pervious nonwoven top sheet 16'. Pad 14' and sheet 16' are bonded by a plurality of adhesive lines 26', as described hereinbefore. The elastic leg encircling crotch areas and waistband areas ensure a tight fit and are important in preventing leakage when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges 28', 30' are generally placed under tension and the diaper surface is drawn reasonably flat.

This embodiment will allow backsheet 12' with sheet 32 bonded thereto, to have the aforementioned elastic areas (e.g., the leg encircling crotch areas) prefabricated, whereby this subassembly (i.e., backsheet 12' with sheet 32 bonded thereto) could be supplied on a roll for use in the manufacture of diapers.

Referring to FIGURES 4 - 8, a diaper in accordance with a third and preferred embodiment of the present invention is shown generally at 40. Diaper 40

comprises a moisture impervious backsheet 42 which is overlaid by a moisture absorbent fluff filler pad (i.e., absorbent core) 44. This, in turn, is covered with a moisture pervious nonwoven top sheet (i.e., coverstock) 46. Once the layers of the diaper have been stacked, as described above, the backsheet and coverstock layers 42, 46 are folded inwardly at lines 48, FIGURE 6 resulting in the configuration shown in FIGURE 7, whereby standing leg gathers 50 are formed. Referring to FIGURE 8, once the layers are folded as described above leg cutouts are made along lines 52. Accordingly, the diaper of this embodiment, has do most diapers, has longitudinal margins which define the leg encircling crotch areas and longitudinal margins which are located in the waistband area. The diapers further have transverse margins which further define the ends of the waistband areas. Adhesive attachment tapes complete the unit, as is known. However, it will be appreciated that hook and loop fasteners (e.g., Velcro® fasteners) or other fastener means may be employed.

Backsheet 42 comprises a moisture impermeable elastic material (e.g., a KRATON® Polymer such as is commercially available from Shell Chemical Company or a polyurethane such as part no. MP-1882P commercially available from the assignee hereof or, a suitable polyethylene or polypropylene) that is multidirectionally stretchable prior to and after attachment to nonwoven top sheet 46. The entire assembly is bonded together by a plurality of adhesive lines, as described below. Alternatively, the assembly is bonded together by a sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method.

Nonwoven top sheet 46 at the leg encircling crotch areas and the raised leg gathers are pleated, e.g., with triangularly (or other) shaped pleats 54, FIGURE 9, (or corrugated) prior to bonding to allow stretching in this area. The shaped pleats provide a variable degree of stretch. The shape of the pleats and the number of pleats varies widely in practice and any normally used method of pleating can be employed by the present invention. The bonding of the un-stretched backsheet to the nonwoven top sheet, at the pleats (or corrugations), will secure the layers and the pleats while allowing the portions of the diaper having these pleats to be

stretched. Accordingly, the backsheet is allowed to stretch, as a result of the bonding to the nonwoven top sheet at the base of the pleats (or corrugations). Cover sheet 46 at the waistband areas is corrugated at 58, FIGURE 10, (or pleated) prior to bonding to allow stretching in this area. The number of corrugations 58 may vary. The bonding of the backsheet to the nonwoven top sheet at the corrugations (or pleats) will secure the layers while allowing the portions of the diaper having these corrugations (or pleats) to be stretched. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges with accompanying folds.

In accordance with an alternate embodiment, backsheet 42 is not required to be comprises of an elastic material. Nonwoven top sheet 46 is comprised of an elastic nonwoven fabric (i.e., a nonwoven fabric incorporating elastic fibers, as is known in the industry) that is multidirectionally stretchable prior to and after attachment to backsheet 42. These sheets are bonded together as described before. Backsheet 42 at the leg encircling crotch areas and the raised leg gathers are pleated, e.g., with triangularly shaped pleats, (or corrugated) prior to bonding to allow stretching in this area. The bonding of the un-stretched nonwoven top sheet to the backsheet, at the pleats (or corrugations), will secure the layers and the pleats (or corrugations) while allowing the portions of the diaper having these pleats (or corrugations) to be stretched. Accordingly, the nonwoven top sheet is allowed to stretch, as a result of the bonding to the backsheet at the base of the pleats (or corrugations). Backsheet 42 at the waistband areas is corrugated (or pleated), prior to bonding to allow stretching in this area. The number of corrugations may vary. The bonding of the backsheet to the nonwoven top sheet at the corrugations (or pleats) will secure the layers while allowing the portions of the diaper having these corrugations (or pleats) to be stretched. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges with accompanying folds.

These elastic leg encircling crotch areas, the raised leg gathers, and the elastic waistband areas ensure a tight fit and are important in preventing leakage

when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges are generally placed under tension and the diaper surface is drawn reasonably flat. The use of an elastic sheet is an important element of the present invention as it can be stretched at various places during the assembly process to produce a three-dimensional products that has a controlled three-dimensional shape on the wearer.

Referring to FIGURES 11 - 17, a feminine pad (or an adult bridge product) in accordance with a fourth and preferred embodiment of the present invention is shown generally at 60. Pad 60 comprises a moisture impervious backsheet 62 which is overlaid by a moisture absorbent core 64. This, in turn, is covered with a moisture pervious nonwoven top sheet (i.e., coverstock) 66. The coverstock has corrugations formed latitudinally at about the longitudinal center thereof, as described more fully hereinbelow. Backsheet 62 comprises a moisture impermeable elastic material (e.g., a KRATON® Polymer such as is commercially available from Shell Chemical Company or a polyurethane such as part no. MP-1882P commercially available from the assignee hereof or, a suitable polyethylene or polypropylene) that is multidirectionally stretchable prior to and after attachment to nonwoven top sheet 66.

By way of example only, pad 60 can be assembled on a form 68, FIGURES 12 - 14. Form 68 is generally rectangular in shape with a curved upper surface 70. A plurality of spaced lateral slots 72 extend across form 68 at about the longitudinal central area thereof. Referring to FIGURES 15 - 17, the coverstock 66 is laid on surface 70 of form 68, where the coverstock inserted into slots 72. The absorbent core 64 is disposed on coverstock 66 and the backsheet 62 is laid over the absorbent core. Once the layers of the pad have been stacked, as described above, the backsheet and coverstock layers 62, 66 are bonded at the corrugations formed by the insertion of the coverstock in the slots 72. Bonding is accomplished by a suitable adhesive. Alternatively, the bonding is accomplished by a sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method.

Referring to FIGURES 18 - 21, absorbent core 64 comprises a first layer 74 of absorbent material having somewhat of an hourglass shape and a second layer 76 of absorbent material also having somewhat of an hourglass shape with outwardly extending tabs 78 depending therefrom. Tabs 78 are folded inwardly as is clearly shown in FIGURE 20. Thereafter, layers 74 and 76 are stacked with the tabs 78 in between, as shown in FIGURE 21.

Referring to FIGURES 22 and 23, the pad is shown in a side view after bonding of the backsheet and the coverstock at the corrugations and with the backsheet in an un-stretched state. Referring to FIGURES 24 and 25, the pad is shown with the backsheet longitudinally stretched, whereby the remaining periphery about the absorbent core of the backsheet and the coverstock are bonded while in the stretched state.

Once the adhesive has cured (i.e., the bonding is completed) and while in the stretched state the pad is trimmed along line 80, resulting in shirred or gathered edges with accompanying folds, see FIGURE 11. Nonwoven sheet 66 (FIGURE 16) may be comprised of an elastic nonwoven fabric (i.e., a nonwoven fabric incorporating elastic fibers, as is known in the industry) that is multidirectionally stretchable prior to and after attachment to backsheet 62, as discussed in the other embodiments of the present invention. These elastic areas are important as they aid in the prevention of leakage when worn by a user. The use of an elastic sheet is an important element of the present invention as it can be stretched at various places during the assembly process to produce a three-dimensional products that has a controlled three-dimensional shape on the wearer.

Referring to FIGURES 26 - 40, a diaper in accordance with still another embodiment of the present invention is shown generally at 100. Diaper 100 comprises a moisture impervious backsheet 102 which is overlaid by a moisture absorbent fluff filler pad (i.e., absorbent core) 104. This, in turn, is covered with an elastic sheet 106 followed by a moisture pervious nonwoven top sheet (i.e., coverstock) 108. Elastic sheet 106 has a generally centered oval shape opening 110 therein (i.e., at the crotch area). Once the layers of the diaper have been stacked,

as described above and as shown in FIGURES 27 and 28, the elastic sheet and coverstock layers 106, 108 are folded inwardly resulting in the configuration shown in FIGURES 29 - 31, whereby standing leg gathers 112 are formed. Referring to FIGURES 32 and 33, elastic sheet 106 is stretched, generally longitudinally as indicated by arrows 114, at the standing leg gathers areas designated A and is stretched, generally longitudinally as indicated by arrows 116, at the leg encircling crotch areas designated B, prior to bonding. The areas designated A are preferably stretched to a greater extent, while the areas designated B are preferably stretched to a lesser extent, such being determined by the particular application of the product. For example, the width of an elasticized area can be expanded to dispurse the forces over a large area.

Referring to FIGURES 34 and 36, elastic sheet 106 at the stretched areas A is adhesively bonded under tension to coverstock 108 and at the stretched areas B is adhesively bonded to both coverstock 108 and backsheet 102, as indicated by the broken lines. Alternatively, the assembly is bonded together by sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method. The elastic can be stretched at these areas to varying degrees to produce varying elasticity, e.g., increasing elasticity moving towards the edge. Once the adhesive has cured (i.e., the bonding is completed), these selected portions are relieved, resulting in shirred or gathered edges with accompanying folds.

Accordingly, the diaper of this embodiment, has do most diapers, has longitudinal margins which define the leg encircling crotch area and longitudinal margins which are located in the waistband area. The diapers further have transverse margins which further define the ends of the waistband areas. Adhesive attachment tapes complete the unit, as is known. However, it will be appreciated that hook and loop fasteners (e.g., Velcro ® fasteners) or other fasteners means may be employed.

The waistband areas of the elastic sheet 106 are transversely stretched prior to adhesive bonding under tension of the elastic sheet 106 to the coverstock 108 and backsheet 102. The elastic can be stretched at these areas to varying degrees to

produce varying elasticity, e.g., increasing elasticity moving towards the edge. Once the adhesive has cured (i.e., the bonding is completed), these selected portions are relieved, resulting in shirred or gathered edges with accompanying folds. Alternatively, cover sheet 108 and backsheet 102 are cooperatively corrugated (or pleated), as described hereinbefore, prior to bonding to allow stretching in this area. The number of corrugations (or pleats) may vary. The bonding of the backsheet and the cover sheet at the corrugations (or pleats) to the elastic sheet will secure the layers while allowing the portions of the diaper having these corrugations (or pleats) to be stretched. Once the adhesive has cured (i.e., the bonding is completed), these selected portions provide shirred or gathered edges with accompanying folds.

Referring to FIGURES 36 - 39, the standing leg gathers 112 are folded inwardly, as shown in FIGURES 36 and 37, resulting in the configuration shown in FIGURES 38 and 39. The standing leg gathers 112 are then bonded at the areas indicated in FIGURE 39. Thereafter, leg cutouts are made along lines 120 (FIGURE 40) to define the leg encircling crotch areas.

Elastic sheet 106 comprises a moisture impermeable elastic material (e.g., a KRATON® Polymer such as is commercially available from Shell Chemical Company or a polyurethane such as part no. MP-1882P commercially available from the assignee hereof or, a suitable polyethylene or polypropylene) that is multidirectionally stretchable prior to and after attachment to the coverstock and/or backsheet. The entire assembly is bonded together by a plurality of adhesive lines, as described hereinbefore. Alternatively, the assembly is bonded together by a sonobonding, ultrasonic welding/bonding, thermobonding or any other suitable method.

These elastic leg encircling crotch areas, the raised leg gathers, and the elastic waistband areas ensure a tight fit and are important in preventing leakage when worn by an infant or adult user. When the diaper is placed on a wearer the shirred edges are generally placed under tension and the diaper surface is drawn reasonably flat. The use of the elastic sheet is an important element of the present invention as it can be stretched at various places during the assembly process to

produce a three-dimensional products that has a controlled three-dimensional shape on the wearer.

While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of illustrations and not limitation.

What is claimed is:

CLAIM 1. In an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the improvement comprising:

at least one of said backing sheet and said cover sheet comprising a stretchable elastic material; and

at least one selected area of said absorbent product having said backing sheet and said cover sheet attached to provide an elasticized zone.

CLAIM 2. The elastic absorbent product of claim 1 wherein said at least one selected area comprises said at least one of said backing sheet and said cover sheet comprising stretchable elastic material being stretched prior to attachment of said backing sheet and said cover sheet.

CLAIM 3. The elastic absorbent product of claim 1 wherein said at least one selected area comprises said at least one of said backing sheet and said cover sheet comprising stretchable elastic material attached to said other one of said backing sheet and said cover sheet at a plurality of pleats therein.

CLAIM 4. The elastic absorbent product of claim 1 wherein said at least one selected area comprises said at least one of said backing sheet and said cover sheet comprising stretchable elastic material attached to said other one of said backing sheet and said cover sheet at a plurality of corrugations therein.

CLAIM 5. The elasticized absorbent product of claim 1 wherein said elasticized absorbent product comprises a diaper having a generally rectangular form and having longitudinal leg contacting edges and transverse waist encircling edges.

CLAIM 6. The elasticized absorbent product of claim 5 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of the diaper.

CLAIM 7. The elasticized absorbent product of claim 6 wherein said at least one selected area comprises an area adjacent to at least one transverse waist encircling edge of the diaper.

CLAIM 8. The elasticized absorbent product of claim 7 wherein said at least one selected area comprises areas adjacent both transverse waist encircling edges of the diaper.

CLAIM 9. The elasticized absorbent product of claim 5 wherein said at least one selected area comprises an area adjacent to least one transverse waist encircling edge of the diaper.

CLAIM 10. The elasticized absorbent product of claim 5 wherein said at least one selected area comprises an area adjacent both transverse waist encircling areas.

CLAIM 11. The elasticized absorbent product of claim 5 in which each longitudinal edge of the diaper is contoured around the leg encircling area.

CLAIM 12. The elasticized absorbent product of claim 11 wherein said at least one selected area comprises an area adjacent to at least one transverse waist encircling edge of the diaper.

CLAIM 13. The elasticized absorbent product of claim 12 wherein said at least one selected area comprises areas adjacent both transverse waist encircling edges of the diaper.

CLAIM 14. The elasticized absorbent product of claim 3 wherein said pleats are triangularly shaped to provide a variable degree of stretch.

CLAIM 15. The elasticized absorbent product of claim 5 further comprises standing leg gathers.

CLAIM 16. The elasticized absorbent product of claim 15 wherein said standing leg gathers are integrally formed by folding in the ends of said backing sheet and said cover sheet.

CLAIM 17. The elasticized absorbent product of claim 16 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of said standing leg gathers.

CLAIM 18. The elasticized absorbent product of claim 5 wherein said diaper includes infant disposable diapers, toddler training pants and adult incontinence disposables.

CLAIM 19. The elasticized absorbent product of claim 1 wherein said backing sheet is comprised of said stretchable elastic material.

CLAIM 20. The elasticized absorbent product of claim 19 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 21. The elasticized absorbent product of claim 19 wherein said backing sheet is comprised of a polymer.

CLAIM 22. The elasticized absorbent product of claim 20 wherein said backing sheet and said cover sheet are each comprised of a polymer.

CLAIM 23. The elasticized absorbent product of claim 1 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 24. The elasticized absorbent product of claim 23 wherein said cover sheet is comprised of a nonwoven fabric incorporation elastic fibers.

CLAIM 25. The elasticized absorbent product of claim 1 wherein said cover sheet is comprised of a nonwoven fabric.

CLAIM 26. The elasticized absorbent product of claim 1 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 27. The elasticized absorbent product of claim 26 wherein said pad comprises a feminine hygiene pad or an adult bridge product.

CLAIM 28. The elasticized absorbent product of claim 26 wherein said cover sheet includes a plurality of lateral corrugations defined at about the longitudinal center of said pad, with said backing sheet being attached to said cover sheet at said corrugations to provide an elasticized zone.

CLAIM 29. The elasticized absorbent product of claim 28 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of said pad which are stretched prior to attachment of said backing sheet to said cover sheet to provide a controlled three-dimensional shape for said pad.

CLAIM 30. The elasticized absorbent product of claim 26 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of said pad which are stretched prior to attachment of said backing sheet to said cover sheet to provide a controlled three-dimensional shape for said pad.

CLAIM 31. The elasticized absorbent product of claim 26 in which periphery of said pad is contoured to a generally hourglass shape.

CLAIM 32. In an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the improvement comprising:

at least one of said backing sheet and said cover sheet comprising a stretchable elastic material; and

at least one selected area of said at least one of said backing sheet and said cover sheet comprising stretchable elastic material being stretched prior to attachment of said backing sheet and said cover sheet to provide an elasticized zone.

CLAIM 33. The elasticized absorbent product of claim 32 wherein said elasticized absorbent product comprises a diaper.

CLAIM 34. The elasticized absorbent product of claim 33 further comprises standing leg gathers.

CLAIM 35. The elasticized absorbent product of claim 32 wherein said backing sheet is comprised of said stretchable elastic material.

CLAIM 36. The elasticized absorbent product of claim 32 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 37. The elasticized absorbent product of claim 35 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 38. The elasticized absorbent product of claim 32 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 39. The elasticized absorbent product of claim 38 wherein said cover sheet includes a plurality of lateral corrugations defined at about the longitudinal center of said pad, with said backing sheet being attached to said cover sheet at said corrugations to provide an elasticized zone.

CLAIM 40. In an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the improvement comprising:

at least one of said backing sheet and said cover sheet comprising a stretchable elastic material; and

at least one selected area of said backing sheet and said cover sheet comprising stretchable elastic material attached to said other one of said backing sheet and said cover sheet at a plurality of pleats therein to provide an elasticized zone.

CLAIM 41. The elasticized absorbent product of claim 40 wherein said pleats are triangularly shaped to provide a variable degree of stretch.

CLAIM 42. The elasticized absorbent product of claim 40 wherein said elasticized absorbent product comprises a diaper.

CLAIM 43. The elasticized absorbent product of claim 42 further comprises standing leg gathers.

CLAIM 44. The elasticized absorbent product of claim 40 wherein said backing sheet is comprised of said stretchable elastic material.

CLAIM 45. The elasticized absorbent product of claim 40 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 46. The elasticized absorbent product of claim 44 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 47. The elasticized absorbent product of claim 48 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 48. The elasticized absorbent product of claim 47 wherein said cover sheet includes a plurality of lateral corrugations defined at about the longitudinal center of said pad, with said backing sheet being attached to said cover sheet at said corrugations to provide an elasticized zone.

CLAIM 49. In an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the improvement comprising:

at least one of said backing sheet and said cover sheet comprising a stretchable elastic material; and

at least one selected area of said backing sheet and said cover sheet comprising stretchable elastic material attached to said other one of said backing sheet and said cover sheet at a plurality of corrugations therein to provide an elasticized zone.

CLAIM 50. The elasticized absorbent product of claim 49 wherein said elasticized absorbent product comprises a diaper.

CLAIM 51. The elasticized absorbent product of claim 50 further comprises standing leg gathers.

CLAIM 52. The elasticized absorbent product of claim 49 wherein said backing sheet is comprised of said stretchable elastic material.

CLAIM 53. The elasticized absorbent product of claim 49 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 54. The elasticized absorbent product of claim 52 wherein said cover sheet is comprised of said stretchable elastic material.

CLAIM 55. The elasticized absorbent product of claim 49 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 56. The elasticized absorbent product of claim 55 wherein said cover sheet includes a plurality of lateral corrugations defined at about the longitudinal center of said pad, with said backing sheet being attached to said cover sheet at said corrugations to provide an elasticized zone.

CLAIM 57. A method of manufacturing an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the method comprising the steps of:

disposing said moisture absorbing filler between said backing sheet and said cover sheet, at least one of said backing sheet and said cover sheet comprising a stretchable elastic material;

utilizing said at least one of said backing sheet and said cover sheet comprising said stretchable elastic material to form at least one elasticized zone; and

attaching said backing sheet to said cover sheet.

CLAIM 58. The method of claim 57 wherein:

said step of utilizing comprises stretching said backing sheet at, at least one selected area; and

said step of attaching comprises attaching said backing sheet to said cover sheet while said at least one of said backing sheet and said cover sheet comprising said stretchable elastic material is stretched, whereby said at least one elasticized zone is defined at said at least one selected area.

CLAIM 59. The method of claim 57 wherein:

said step of utilizing comprises forming a plurality of pleats at, at least one selected area in said other one of said backing sheet and said cover sheet; and

said step of attaching comprises attaching said backing sheet to said cover sheet at said pleats, whereby said at least one elasticized zone is defined at said at least one selected area.

CLAIM 60. The method of claim 57 wherein:

said step of utilizing comprises forming a plurality of corrugating at, at least one selected area in said other one of said backing sheet and said cover sheet; and

said step of attaching comprises attaching said backing sheet to said cover sheet at said corrugations, whereby said at least one elasticized zone is defined at said at least one selected area.

CLAIM 61. The method of claim 57 wherein said elasticized absorbent product comprises a diaper having a generally rectangular form and having longitudinal leg contacting edges and transverse waist encircling edges.

CLAIM 62. The method of claim 57 wherein at least one elasticized zone comprises elasticized leg zones.

CLAIM 63. The method of claim 62 wherein said at least one elasticized zone further comprises an elasticized waist zone.

CLAIM 64. The method of claim 61 wherein said at least one elasticized zone comprises an elasticized waist zone.

CLAIM 65. The method of claim 61 further comprising the step of:

trimming each longitudinal edge of the diaper to contour around the leg encircling area.

CLAIM 66. The method of claim 65 wherein said at least one elasticized zone comprises an elasticized waist zone.

CLAIM 67. The method of claim 59 wherein said pleats are triangularly shaped to provide a variable degree of stretch.

CLAIM 68. The method of claim 61 further comprising the steps of:

folding in the longitudinal ends of said backing sheet and said cover sheet, whereby the longitudinal ends of said backing sheet are disposed between said cover sheet to form integral standing leg gathers.

CLAIM 69. The method of claim 61 wherein said at least one elasticized zone comprises elasticized standing leg gathers.

CLAIM 70. The method of claim 61 wherein said diaper includes infant disposable diapers, toddler training pants and adult incontinence disposables.

CLAIM 71. The method of claim 57 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 72. The method of claim 71 wherein said pad comprises a feminine hygiene pad or an adult bridge product.

CLAIM 73. The method of claim 71 further comprises the step of:

forming a plurality of lateral corrugations in said cover sheet at about the longitudinal center of said pad; and

wherein said step of attaching comprises attaching said backing sheet to said cover sheet at said corrugations to provide said at least one elasticized zone.

CLAIM 74. The method of claim 73 wherein:

said step of utilizing comprises longitudinally stretching said backing sheet; and

said step of attaching comprises attaching said backing sheet to said cover sheet at areas adjacent at least portions of each longitudinal edge of said pad to provide a controlled three-dimensional shape for said pad.

CLAIM 75. The method of claim 71 wherein:

said step of utilizing comprises longitudinally stretching said backing sheet; and

said step of attaching comprises attaching said backing sheet to said cover sheet at areas adjacent at least portions of each longitudinal edge of said pad to provide a controlled three-dimensional shape for said pad.

CLAIM 76. The method of claim 71 further comprising the step of:

trimming the periphery of said pad to contour a generally hourglass shape.

CLAIM 77. In an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the improvement comprising:

an elastic sheet disposed between said cover sheet and said backing sheet; and

at least one selected area of said elastic sheet being stretched prior to attachment of said elastic sheet to at least one of said cover sheet and said backing sheet to provide an elasticized zone.

CLAIM 78. The elasticized absorbent product of claim 77 wherein said elasticized absorbent product comprises a diaper having a generally rectangular form and having longitudinal leg contacting edges and transverse waist encircling edges.

CLAIM 79. The elasticized absorbent product of claim 78 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of the diaper.

CLAIM 80. The elasticized absorbent product of claim 78 wherein said at least one selected area comprises an area adjacent to at least one transverse waist encircling edge of the diaper.

CLAIM 81. The elasticized absorbent product of claim 79 in which each longitudinal edge of the diaper is contoured around the leg encircling area.

CLAIM 82. The elasticized absorbent product of claim 81 wherein said at least one selected area comprises an area adjacent to at least one transverse waist encircling edge of the diaper.

CLAIM 83. The elasticized absorbent product of claim 78 further comprises standing leg gathers.

CLAIM 84. The elasticized absorbent product of claim 83 wherein said standing leg gathers are integrally formed by folding said elastic sheet and at least one said backing sheet and said cover sheet.

CLAIM 85. The elasticized absorbent product of claim 84 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of said standing leg gathers.

CLAIM 86. The elasticized absorbent product of claim 78 wherein said diaper includes infant disposable diapers, toddler training pants and adult incontinence disposables.

CLAIM 87. The elasticized absorbent product of claim 77 wherein said elastic sheet is comprised of a polymer.

CLAIM 88. The elasticized absorbent product of claim 77 wherein said cover sheet is comprised of a nonwoven fabric.

CLAIM 89. The elasticized absorbent product of claim 77 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 90. The elasticized absorbent product of claim 77 wherein said elastic sheet is disposed adjacent said cover sheet.

CLAIM 91. The elasticized absorbent product of claim 90 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 92. The elasticized absorbent product of claim 78 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 93. The elasticized absorbent product of claim 78 wherein said elastic sheet is disposed adjacent said cover sheet.

CLAIM 94. The elasticized absorbent product of claim 93 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 95. The elasticized absorbent product of claim 77 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 96. The elasticized absorbent product of claim 95 wherein said pad comprises a feminine hygiene pad or an adult bridge product.

CLAIM 97. The elasticized absorbent product of claim 95 wherein said at least one selected area comprises areas adjacent at least portions of each longitudinal edge of said pad which are stretched prior to attachment of said elastic sheet to at least one said backing sheet and said cover sheet to provide a controlled three-dimensional shape for said pad.

CLAIM 98. The elasticized absorbent product of claim 95 in which periphery of said pad is contoured to a generally hourglass shape.

CLAIM 99. The elasticized absorbent product of claim 95 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 100. The elasticized absorbent product of claim 95 wherein said elastic sheet is disposed adjacent said cover sheet.

CLAIM 101. The elasticized absorbent product of claim 100 wherein said elastic sheet includes an opening therein, said opening generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 102. A method of manufacturing an elasticized absorbent product of the type having a moisture permeable skin contacting cover sheet, a moisture impermeable backing sheet, and a moisture absorbing filler pad disposed therebetween, the method comprising the steps of:

disposing said moisture absorbing filler between said backing sheet and said cover sheet;

disposing an elastic sheet between said backing sheet and said cover sheet;

utilizing said elastic sheet to form at least one elasticized zone; and

attaching said elastic sheet to at least one said backing sheet and said cover sheet.

CLAIM 103. The method of claim 102 wherein:

said step of utilizing comprises stretching said elastic sheet at, at least one selected area; and

said step of attaching comprises attaching said elastic sheet to at least one said backing sheet and said cover sheet while said elastic sheet is stretched, whereby said at least one elasticized zone is defined at said at least one selected area.

CLAIM 104. The method of claim 102 further comprising the step of:

forming an opening in said elastic sheet generally corresponding with a crotch area of said elastic absorbent product.

CLAIM 105. The method of claim 102 wherein said elasticized absorbent product comprises a diaper having a generally rectangular form and having longitudinal leg contacting edges and transverse waist encircling edges.

CLAIM 106. The method of claim 102 wherein at least one elasticized zone comprises elasticized leg zones.

CLAIM 107. The method of claim 106 wherein said at least one elasticized zone further comprises an elasticized waist zone.

CLAIM 108. The method of claim 105 wherein at least one elasticized zone comprises an elasticized waist zone.

CLAIM 109. The method of claim 105 further comprising the step of:

trimming each longitudinal edge of the diaper to contour around the leg encircling area.

CLAIM 110. The method of claim 109 wherein said at least one elasticized zone comprises an elasticized waist zone.

CLAIM 111. The method of claim 105 wherein:

said step of utilizing comprises,

(a) folding said elastic sheet and at least one said backing sheet and said cover sheet, and

(b) stretching said elastic sheet where folded; and

said step of attaching comprises attaching said elastic sheet to at least one of said backing sheet and said cover sheet where folded while said elastic sheet is stretched, whereby integral standing leg gathers are defined.

CLAIM 112. The method of claim 105 wherein said at least one elasticized zone comprises elasticized standing leg gathers.

CLAIM 113. The method of claim 105 wherein said diaper includes infant disposable diapers, toddler training pants and adult incontinence disposables.

CLAIM 114. The method of claim 102 wherein said elasticized absorbent product comprises a pad having a generally rectangular form.

CLAIM 115. The method of claim 114 wherein said pad comprises a feminine hygiene pad or an adult bridge product.

CLAIM 116. The method of claim 102 wherein:

said step of utilizing comprises stretching said elastic sheet; and

said step of attaching comprises attaching said elastic sheet to at least one said backing sheet and said cover sheet to provide a controlled three-dimensional shape for said pad.

CLAIM 117. The method of claim 114 further comprising the step of:

trimming the periphery of said pad to contour a generally hourglass shape.

CLAIM 118. The elasticized absorbent product of claim 21 wherein said polymer comprises polyurethane, polyethylene or polypropylene.

CLAIM 119. The elasticized absorbent product of claim 22 wherein said polymer comprises polyurethane, polyethylene or polypropylene.

CLAIM 120. The elasticized absorbent product of claim 87 wherein said polymer comprises polyurethane, polyethylene or polypropylene.

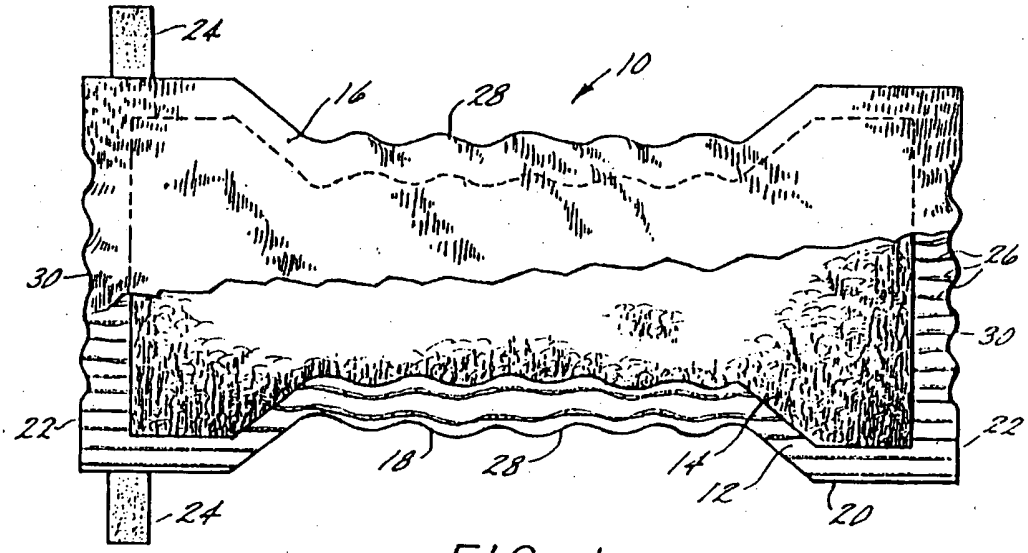


FIG. 1

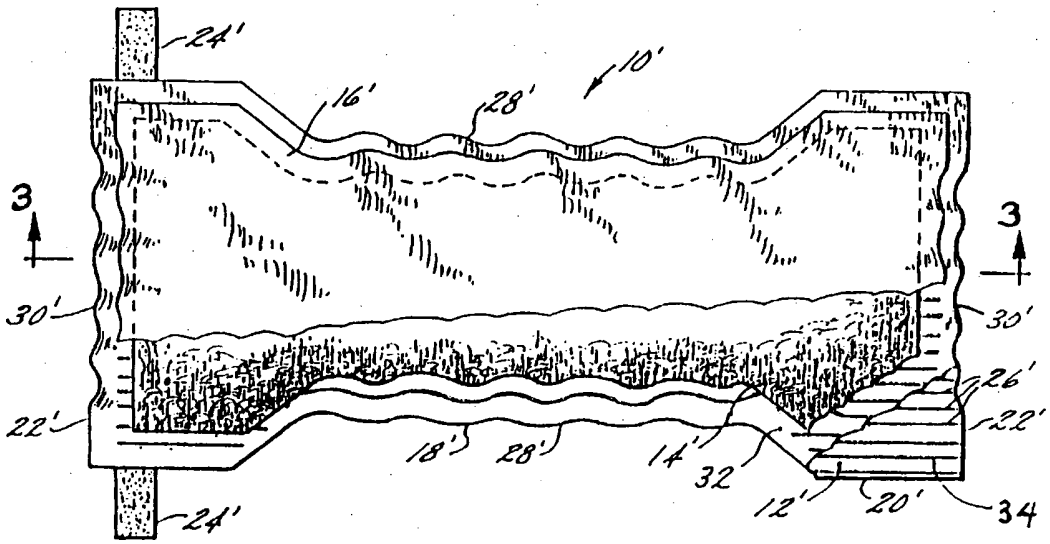


FIG. 2

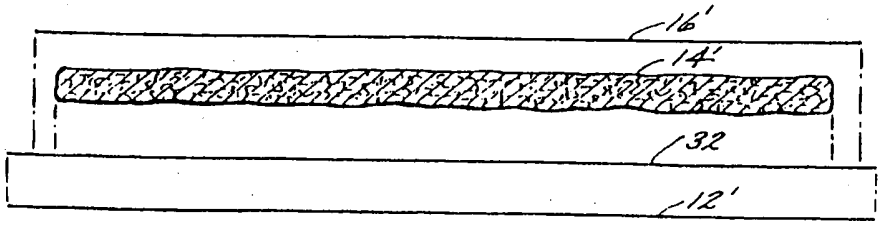


FIG. 3

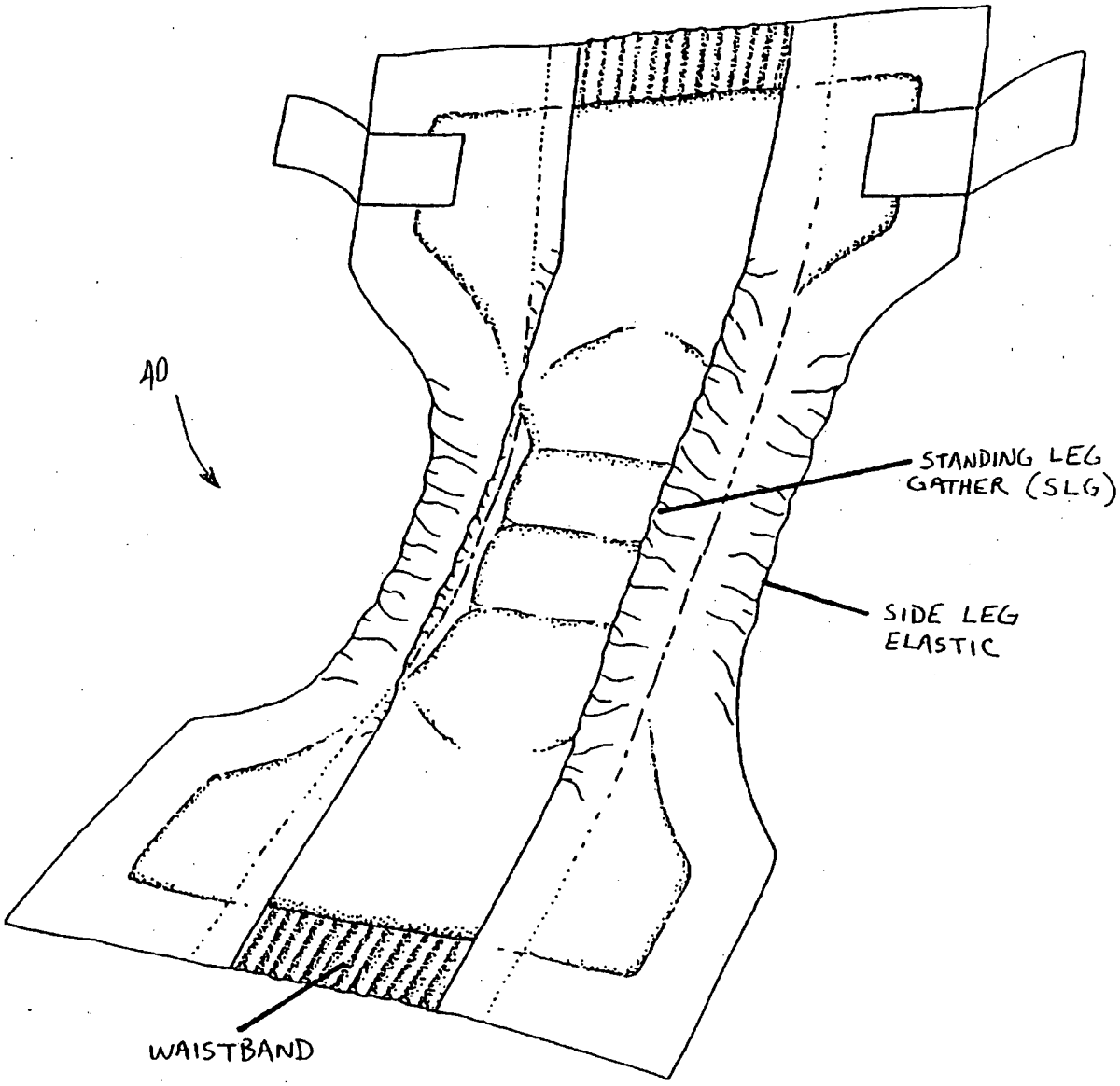


FIG. 4

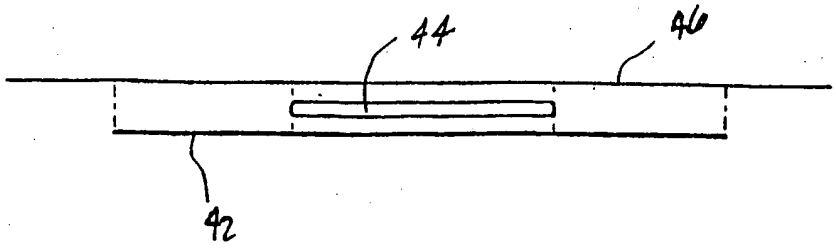


FIG. 5

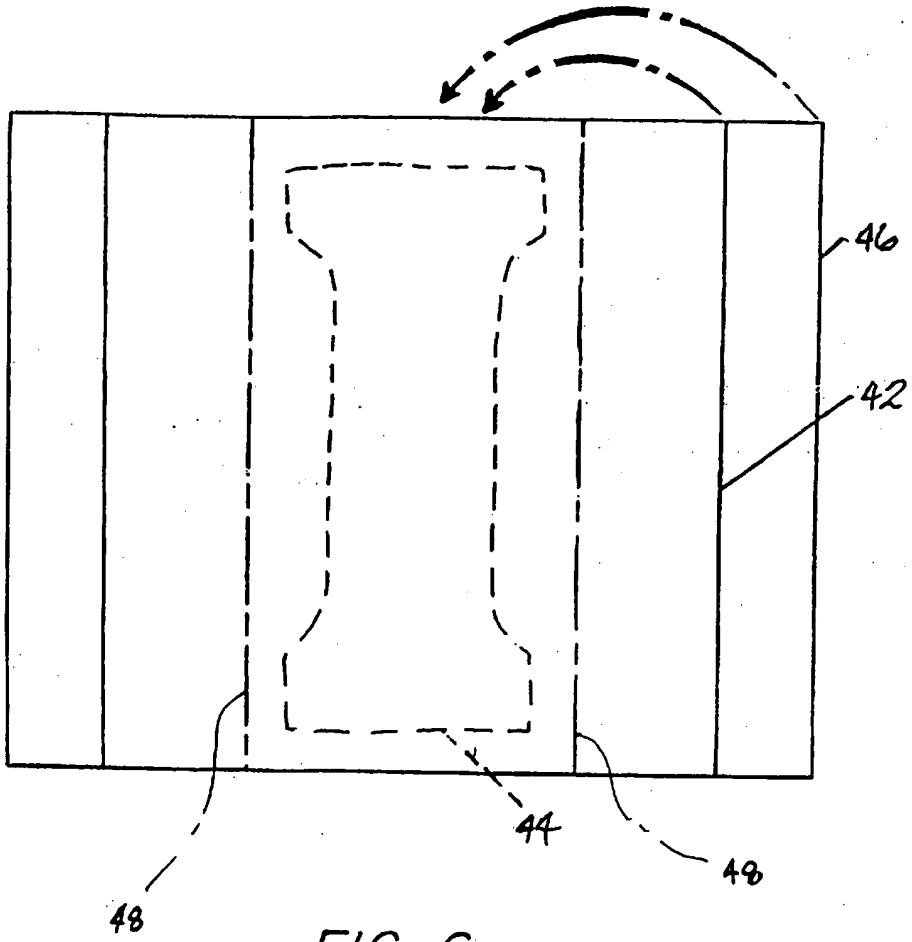


FIG. 6

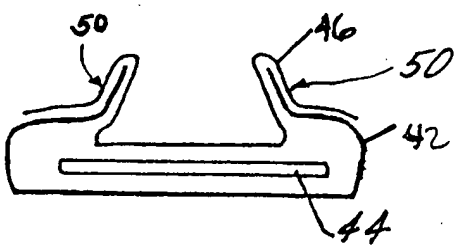


FIG. 7

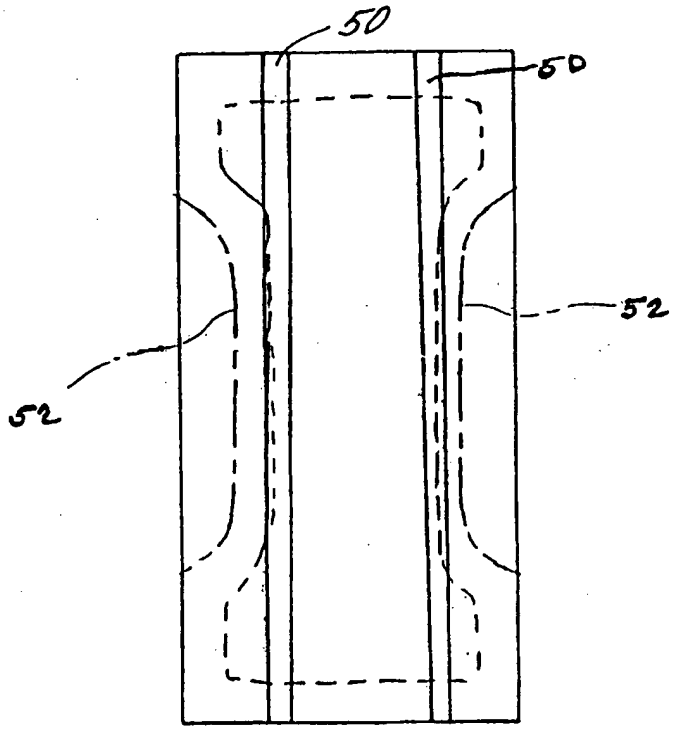


FIG. 8

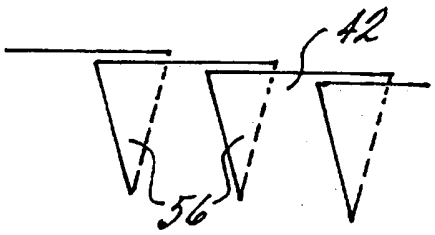


FIG. 9

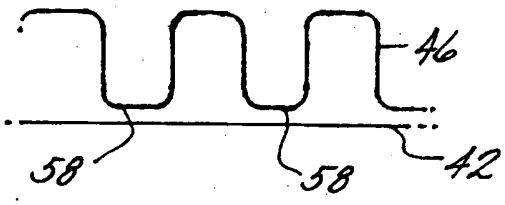


FIG. 10

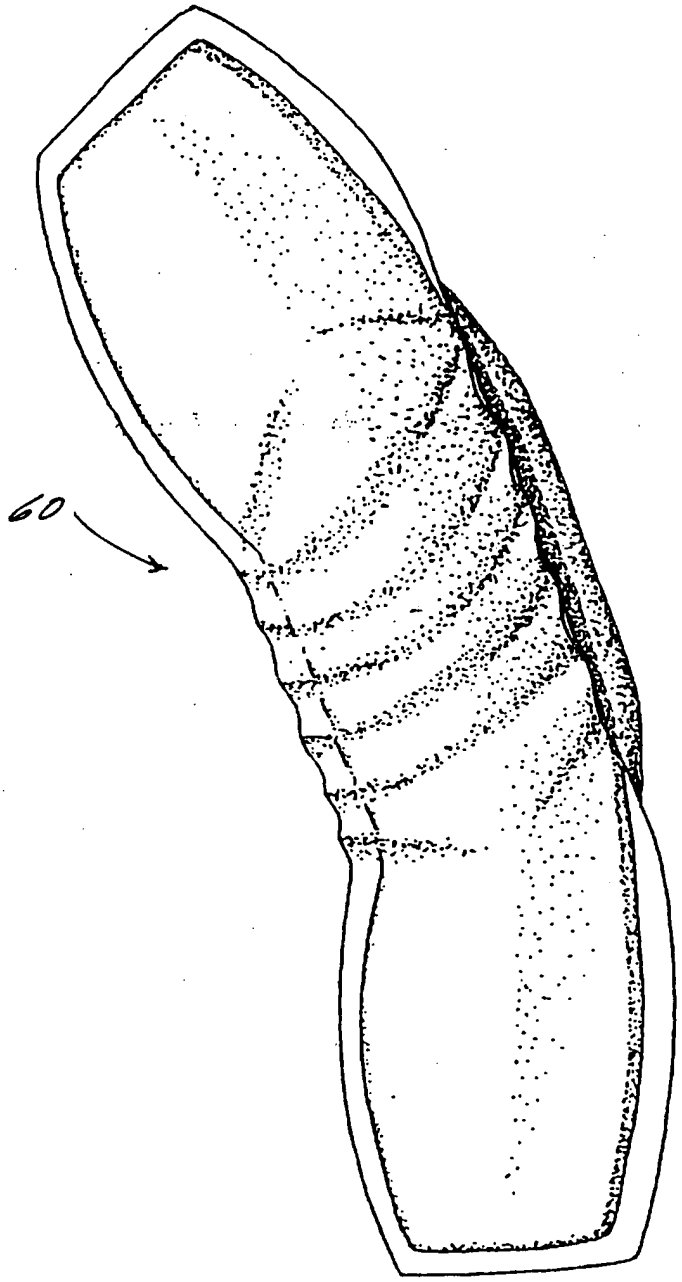
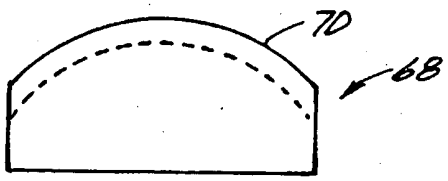
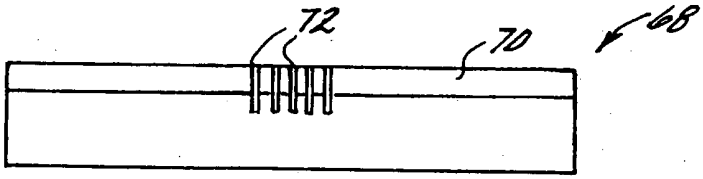


FIG. 11



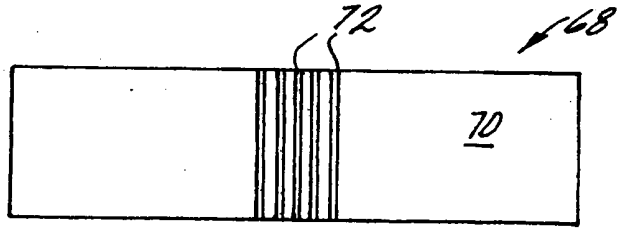
FORM-END VIEW

FIG. 12



FORM-SIDE VIEW

FIG. 13



FORM-TOP VIEW

FIG. 14

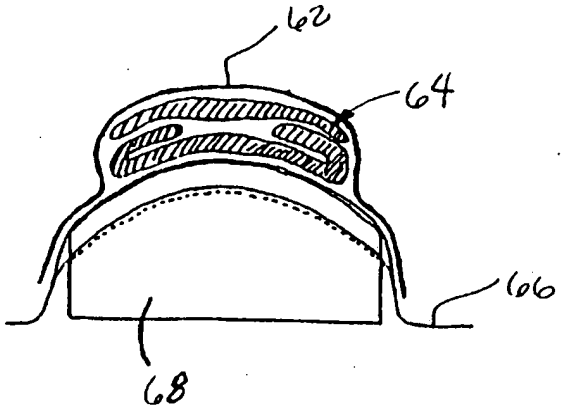


FIG. 15

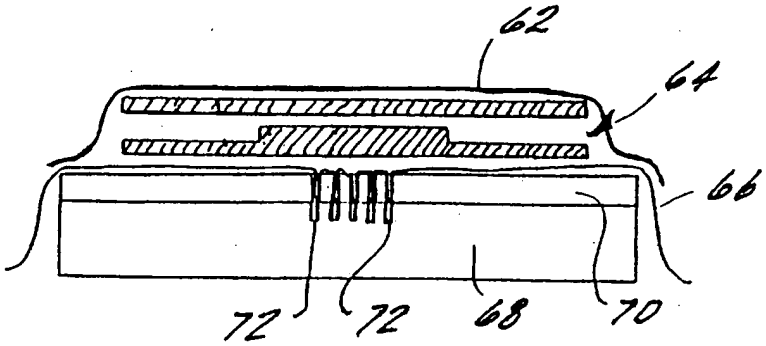


FIG. 16

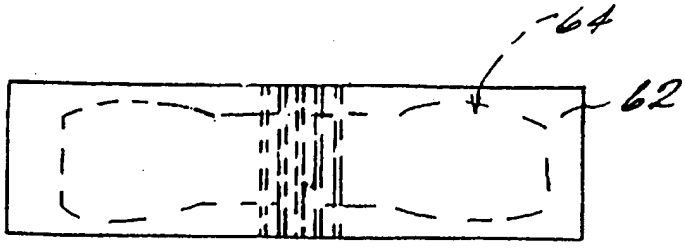


FIG. 17

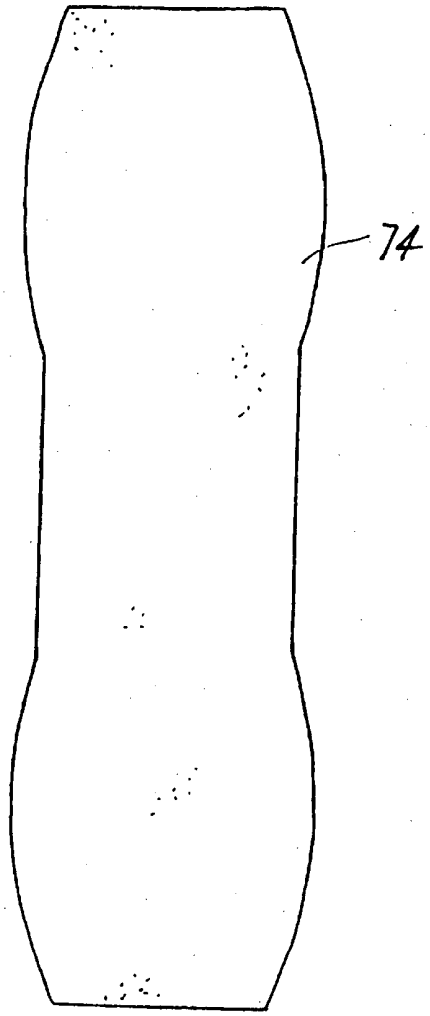


FIG. 18

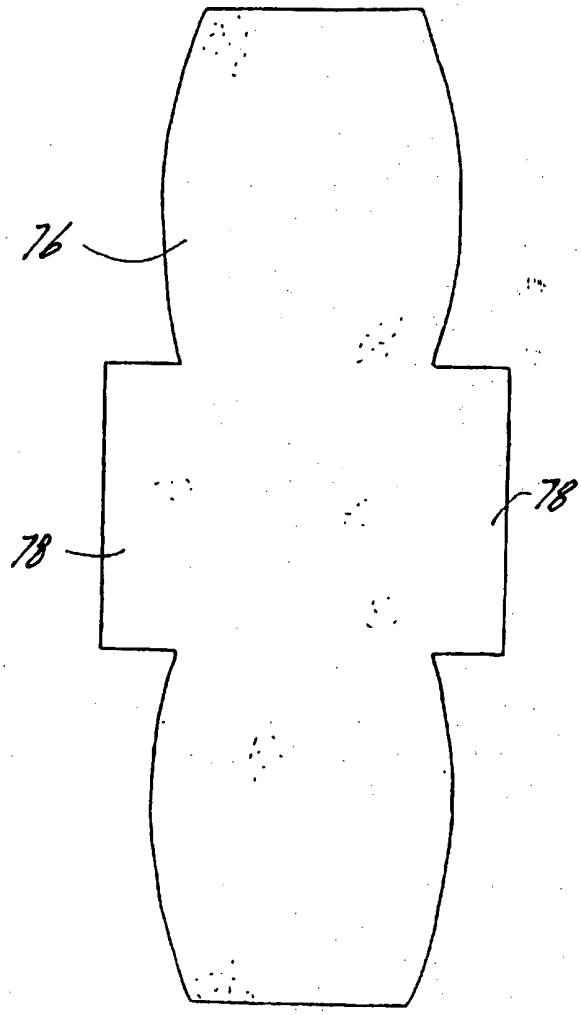


FIG. 19

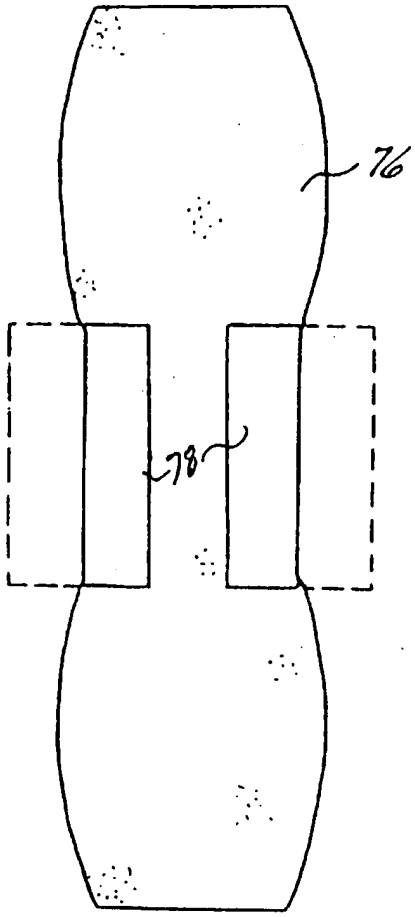


FIG. 20

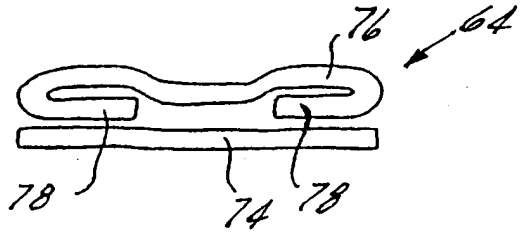


FIG. 21

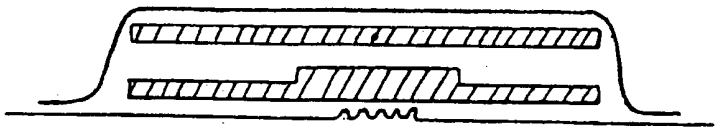


FIG. 22

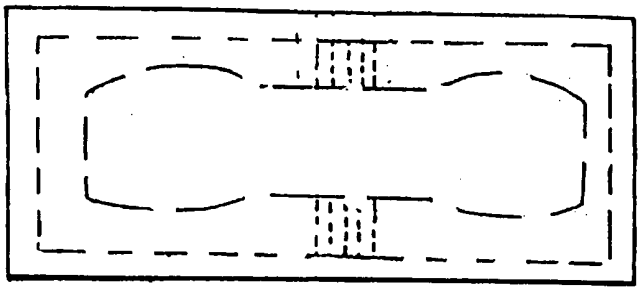


FIG. 23

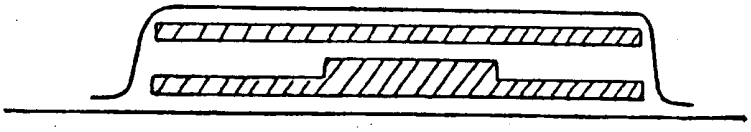


FIG. 24

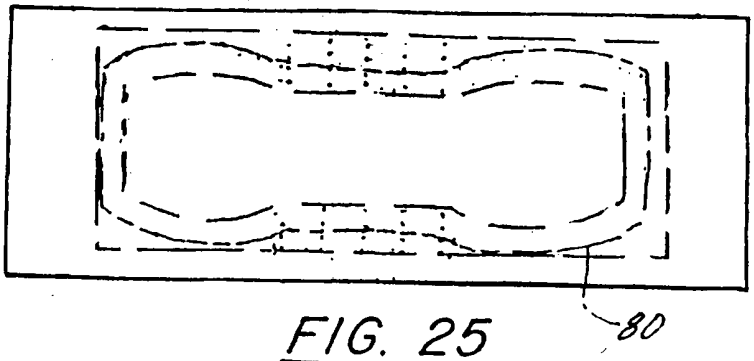


FIG. 25

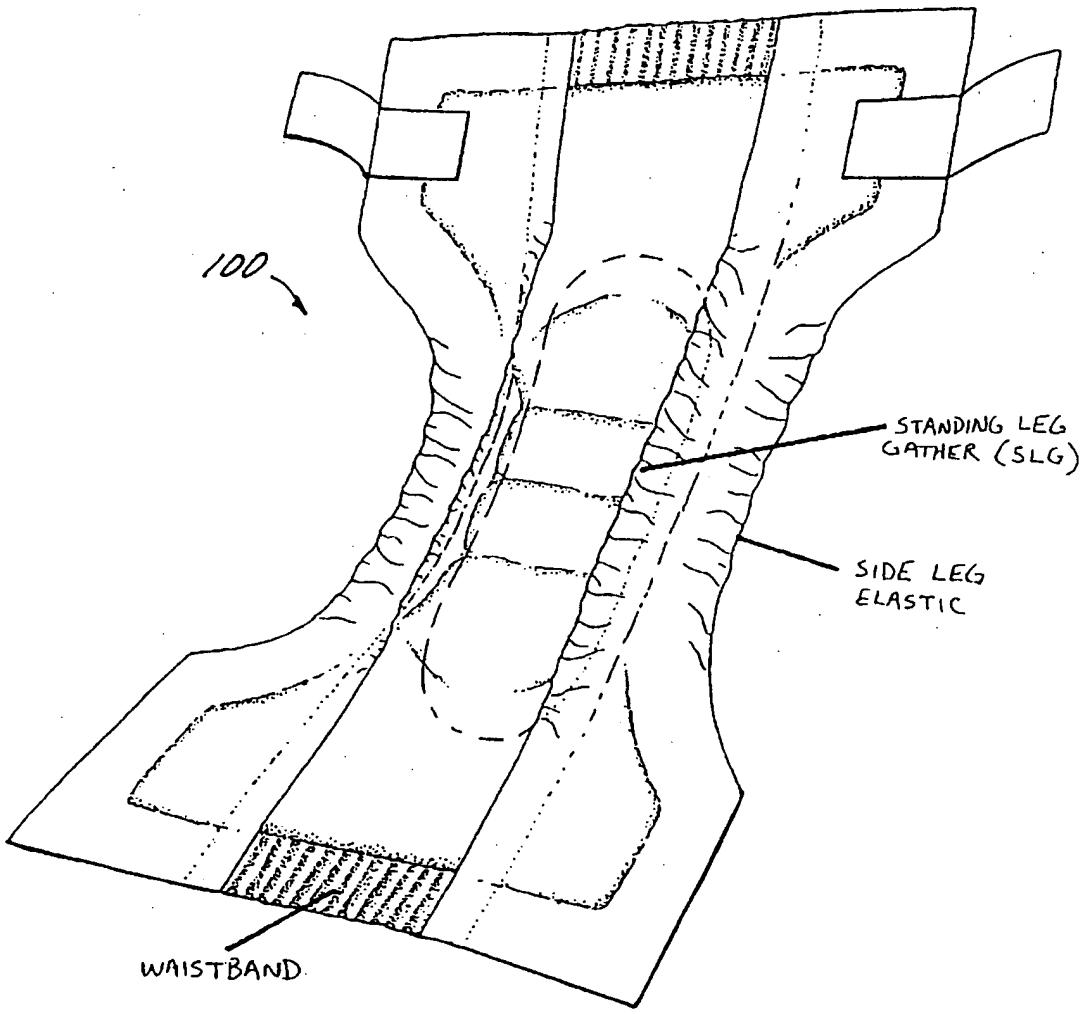


FIG. 26

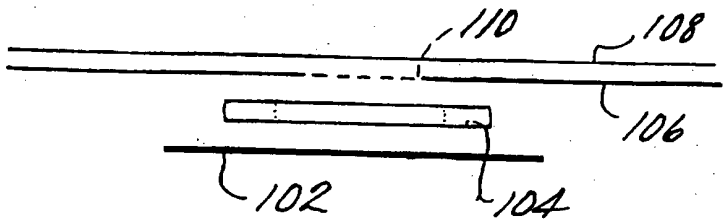


FIG. 27

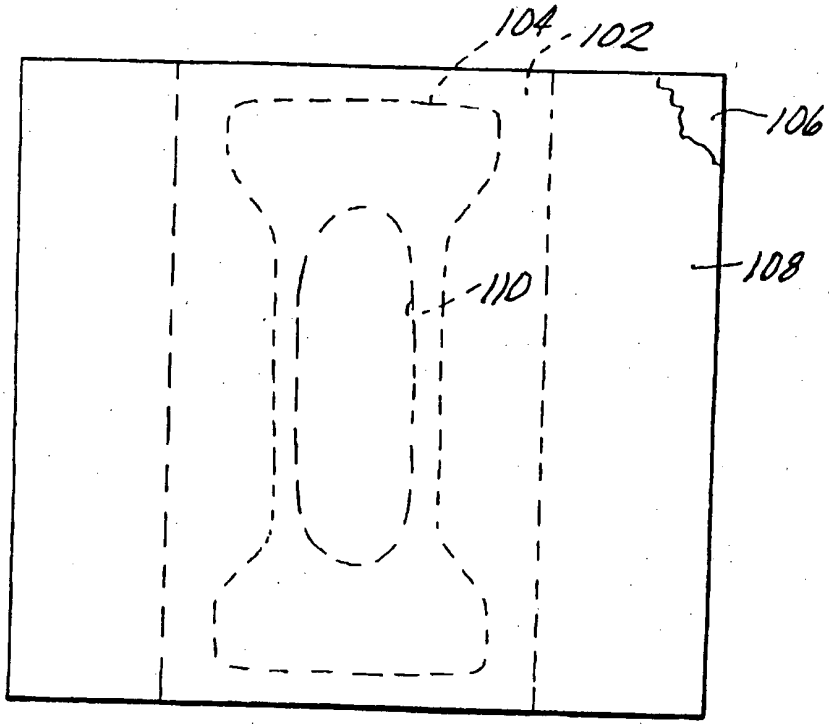


FIG. 28

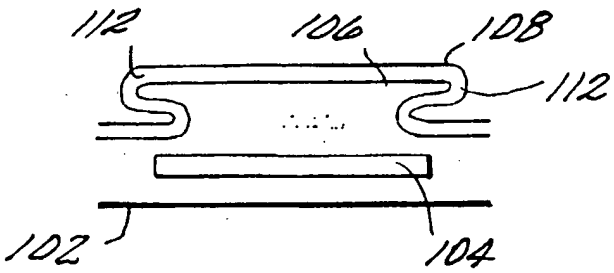


FIG. 30

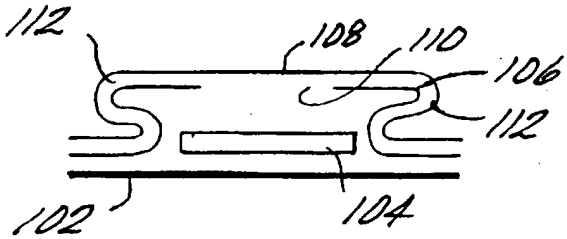


FIG. 31

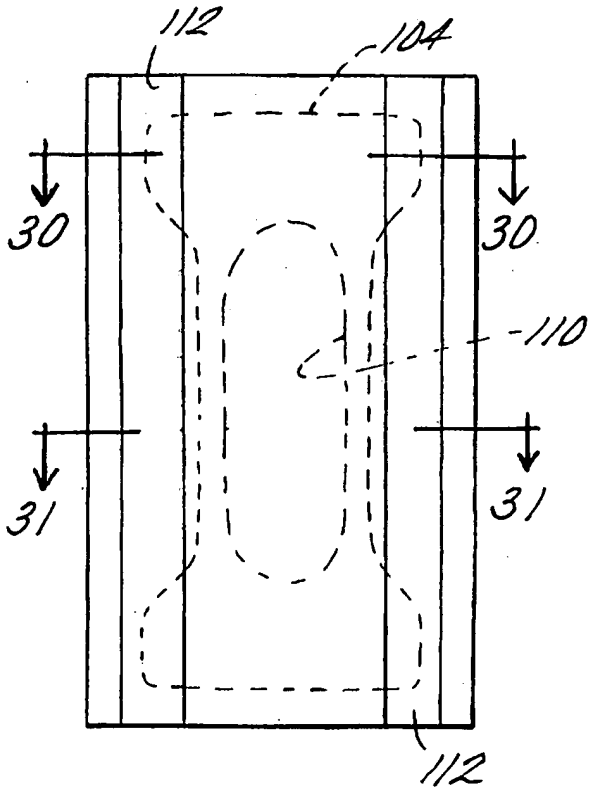


FIG. 29

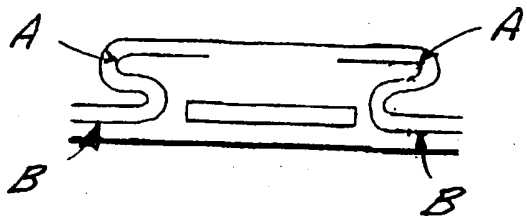


FIG. 32

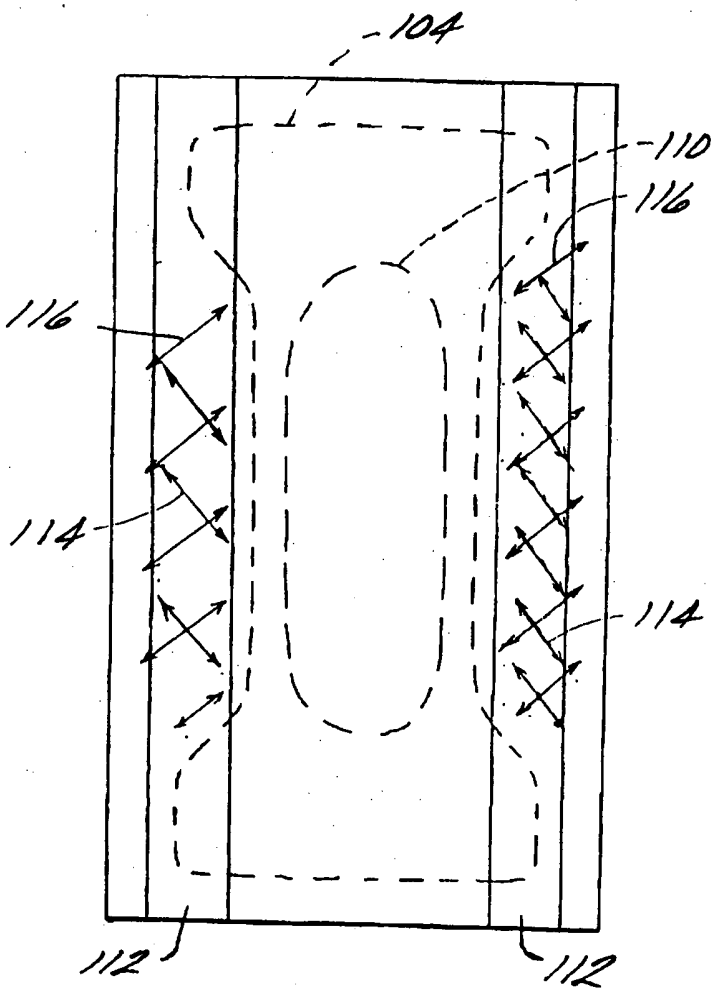


FIG. 33

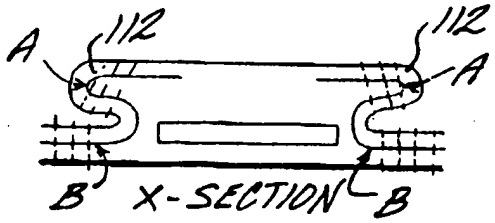


FIG. 34

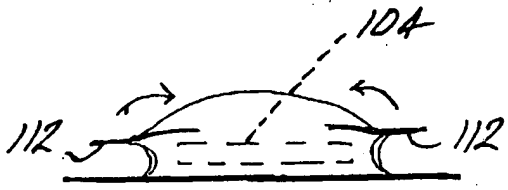


FIG. 36

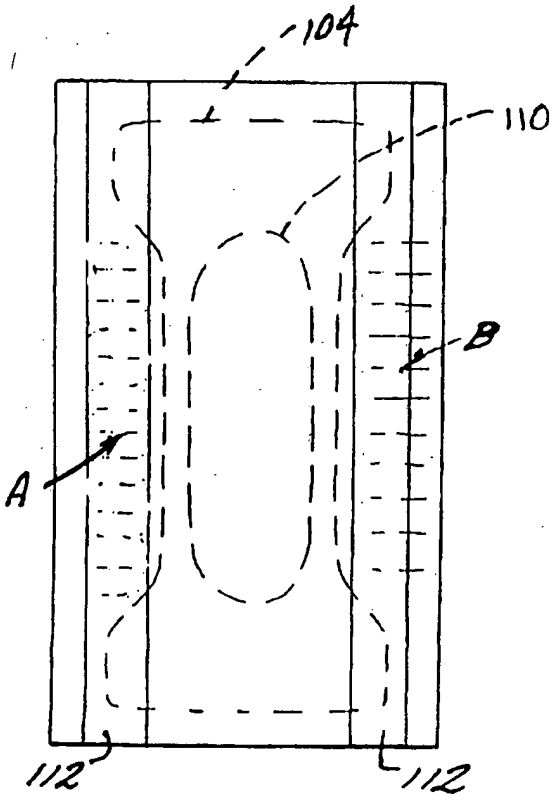


FIG. 35

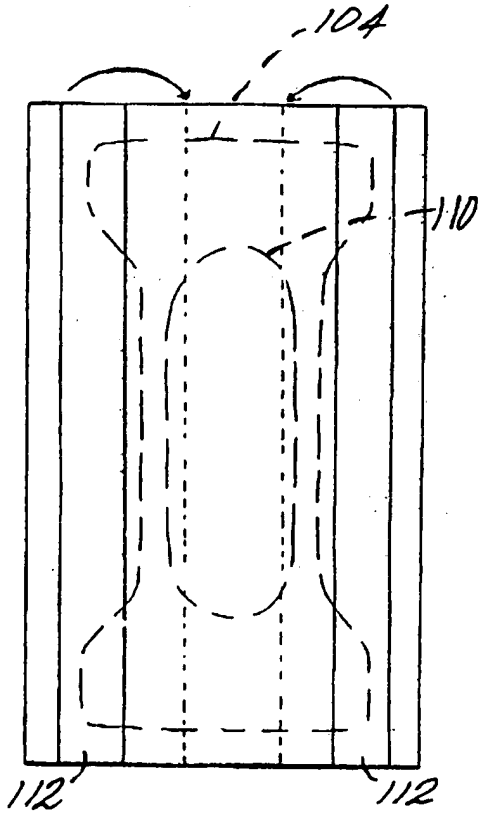


FIG. 37

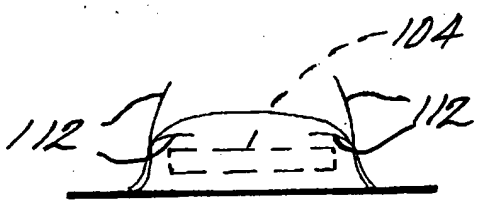


FIG. 38

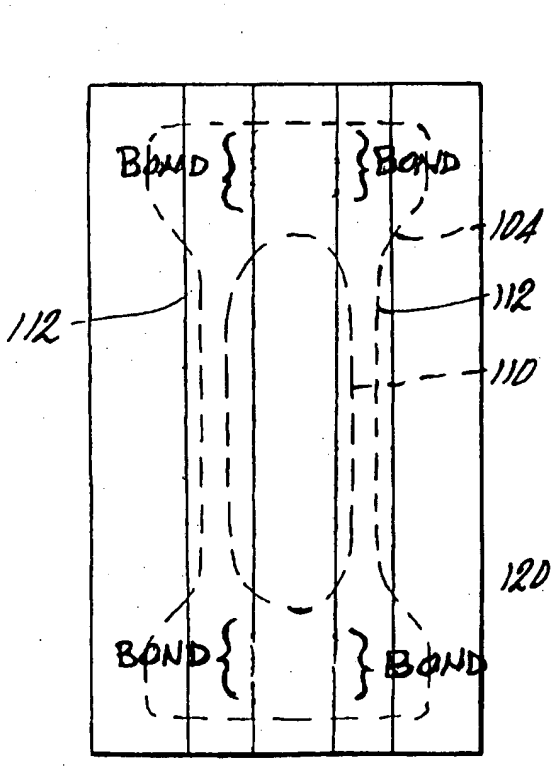


FIG. 39

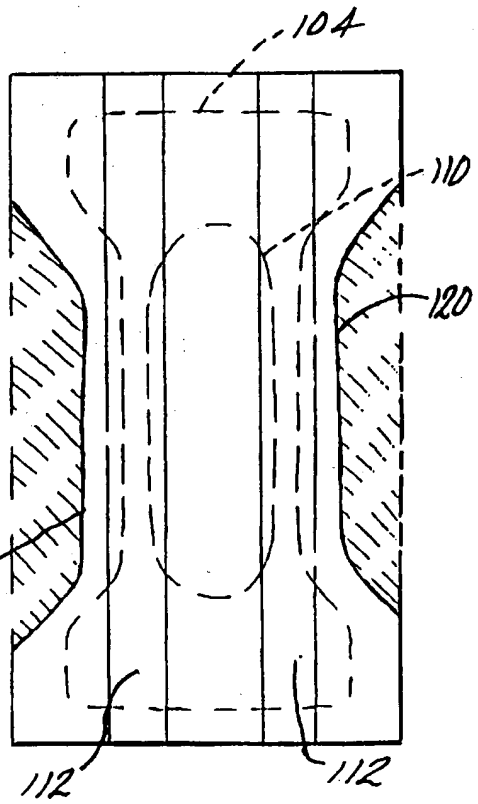


FIG. 40

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/08594

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :A61F 13/15
US CL :604/385.2

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/385.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,726,807 A (YOUNG et al) 23 February 1988, abstract.	1-120

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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